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Load-bearing Brick Buildings for Developing Countries INTERNATIONAL SEMINAR

Despite the fact that bricks are one of the commonest of building materials since ancient times, it is only in recent years that the building scientists and engineers have turned their attention to this versatile low-energy input and labour-intensive building material. One can hardly think of a better example of appropriate technology in the context of building engineering for the developing countries. The situation is somewhat analogous to the reawakening interest in coal as the source of energy in the wake of energy crisis created by shortage of petroleum resources. Doubtless the massive structures of brickwork, as for example in Nalanda, stand testimony to structural soundness, but the builders of today can ill-afford to construct such structures what with the scarcity of resources and ever-rising cost of

construction. What is therefore needed today is a rational design of high-rise brickwork structures to solve the formidable problem of housing and other buildings in developing countries.

It was against this background that an international seminar on 'Planning, design, and construction of load-bearing brick buildings for developing countries' was held in New Delhi from 29 November to 3 December 1981. The seminar was organized by the Central Building Research Institute (CBRI), Roorkee, in collaboration with the Department of Civil Engineering and Building Science, University of Edinburgh, UK, and co-sponsored by the Institution of Engineers (India), Delhi Centre. Funded by Unesco, British Council and Commonwealth Foundation, the seminar provided an

international forum for exchange of information on current researches on all aspects of load-bearing brickwork.

The upshot of the seminar was a resolution addressed to sponsoring governments and international agencies which called, among others, for the promotion of cooperative research projects in these areas between centres of developed and developing countries.

It was the consensus of the 120-odd delegates from India, Nepal, Malaysia, Canada, UK, Pakistan, Korea and other countries that practically all countries could make bricks from indigenous materials. The delegates were also of the opinion that brick masonry was an appropriate technology for the Third World countries and hence a prime contributor to the solution of the housing problem.

The seminar's deliberations spanned seven technical sessions in which some 25 technical papers were presented and discussed. The papers covered a wide range of aspects of load-bearing brickwork: planning, design, construction and structural behaviour including reinforced and pre-stressed brickwork, and the behaviour of infilled frames and walls on beams. The seminar's deliberations focused on various aspects of brick masonry



Seated on the dais are: (from left) Prof. A.W. Hendry (University of Edinburgh), seminar co-chairman; Prof. S. Nurul Hasan, CSIR's Vice President, who inaugurated the seminar; Prof. Dinesh Mohan (CBRI's Director), seminar chairman; Dr Herkko L. Lehtovirta, Unesco Representative; and Shri S. Srinivasan (Scientist, CBRI), seminar coordinator. Dr B.P. Sinha (University of Edinburgh), seminar convener, is addressing the delegates.

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technology of relevance to developing countries.

Inaugurating the seminar, CSIR's Vice President Prof. S. Nurul Hasan underscored the appropriateness and relevance of the seminar to developing countries. Referring to the ambitious construction programmes envisaged in India's sixth Five-Year Plan, in which 60-70 billion bricks would be needed annually to meet the construction targets as against the present production of 40 billion bricks per year, Prof. Nurul Hasan stressed the need for modernization of brick production and effective exploitation of its potential. In providing housing to the millions, Prof. Hasan said, we have to evolve technologies based on the most developed and sophisticated scientific concepts and understanding of materials sciences which would enable us to draw up a construction programme which is most suitable to our climate and social environment.

The Vice President also mentioned the contributions made by some CSIR laboratories and others in the production of good-quality bricks from inferior raw materials; prefabricated brick panels for roofing; bricks from fly ash; and designs of economical brick buildings in earthquake-prone areas.

In his address, Prof. Dinesh Mohan, CBRI's director, mentioned that research workers in different countries had worked out rational designs of brickwork, taking into consideration the physical and chemical properties of the brick as also of the mortar, which had led to the design of high-rise buildings with single-brick-thick walls. CBRI, he mentioned, had helped the Indian Standards Institution to draw up a standard code of practice on load-bearing brickwork. Besides, CBRI's work had led to upgrading the quality of bricks in certain regions like Madhya Pradesh, Andhra Pradesh and Hyderabad. The institute had developed a prefabricated brick panel system for roofing, which had been adopted for constructing thousands of houses for low-income group of people in the

country. As a result, considerable economies had been effected in comparison with the traditional R.C.C. slab. In concluding his address, Prof. Dinesh Mohan expressed the hope that the Indian building construction industry would benefit from the experience of overseas countries where builders had succeeded in constructing load-bearing brick buildings of more than four storeys.

Recommendations

The seminar-cum-workshop made a number of recommendations/suggestions to promote intensive R&D activity in materials; masonry properties; building design and construction; and education and training. In the area of building materials, it called for (i) exploring the means to improve the quality of bricks; (ii) identification of brick types, dimensions and materials for optimum use in a given locality against the background of availability of raw materials, market size, etc.; (iii) evaluation of mortar materials and properties according to availability; and (iv) augmentation of the production of quality bricks to bridge the shortage through such measures as earmarking specific areas for brick kiln location in the zonal and regional development plans of a country.

With regard to masonry properties, the seminar recommended that tests should be undertaken on brick masonry for compressive strength, shear strength, strength under bi-axial stress and brick-mortar adhesion, and that,

based on test results, appropriate small specimen tests should be devised so that the properties of a wide range of products could be evaluated for subsequent use in design. It also suggested establishing a classification system for bricks according to properties and application.

In the area of building design and construction, the seminar called for (i) preparation of review codes of practice or standards against the best current practices or confirmed research results, (ii) review of the problems of masonry building design in different zones; (iii) development of relevant types of reinforced and pre-stressed masonry, especially in relation to earthquake resistance; (iv) introduction of improved methods of structural analysis and methods of calculating the design strength of masonry elements; (v) investigation of the suitability of foundation systems for various soil conditions taking into account soil-structure interaction; and (vi) investigation of problems of durability including the effect of movements, corrosion of reinforcement, etc.

Recognizing the vital importance of disseminating both theoretical knowledge and practical experience, the seminar recommended, among others, promotion of education and training to extend the knowledge of masonry construction in developing countries at all levels of construction industry, and holding of such seminars at national and international levels. □

Role of Science and Technology in the Development of Uttar Pradesh SYMPOSIUM AT CDRI

How science and technology can bring about the socio-economic development of Uttar Pradesh constituted the subject of the title symposium held from 18 to 20 September 1981. The symposium was organized by the Forum for Science, Technology and Society in collaboration with State Planning Institute, Uttar Pradesh, and four national laboratories, viz. Central Drug

Research Institute (CDRI), Industrial Toxicology Research Centre, Central Institute of Medicinal and Aromatic Plants, and National Botanical Research Institute. The areas in which science and technology could play a vital role and on which attention was focused were: power generation, land utilization and soil management; cottage industries and handicrafts; popu-

lation and urban development; health; education; and scientific temper.

Dr G.S. Sidhu, Director General, CSIR, pointed out how national laboratories had been working for speedy development of the country. Shri Dayal Krishna, U.P.'s Minister for Science and Technology, suggested that a computer data bank be set up to keep records and expedite information flow for decision-making.

Delivering the keynote address, Prof. A. Rahman, president of the forum, set directions to the deliberations that followed when he emphasized the need to increase productivity in industrial units, to create training facilities for traditional crafts and artisans, and to improve the level of science education. He underscored the need for proper coordination among politicians, bureaucrats, scientists and industrialists while implementing developmental programmes. He also called for a greater involvement of younger scientists in the cultivation of scientific temper in the state.

Shri N.D. Tewari, Union Minister of Industry, in his address, sought active involvement of the entire scientific community in the implementation of the sixth Five-Year Plan. Shri C.P.N. Singh, Union Minister of State for Science and Technology, while appreciating the forum's efforts in organizing the symposium, desired that such an experiment deserved replication in other backward regions of the country. Prof. S. Nurul Hasan, CSIR's Vice President, reviewed the historical context of the socio-economic development of Uttar Pradesh and called for maximum utilization of the vast natural resources and scientific manpower available in the state. He highlighted CSIR's role in providing scientific and technological inputs for the development of the state.

Recommendations

The deliberations of the symposium led to a number of important recommendations:

In order to meet the power needs of the hill regions, the symposium

suggested that the performance of micro-hydel stations be improved and more intensive research be undertaken to design such small units. So that the implementation of the above recommendation does not lead to disharmony with the environment, the symposium called for a critical study of the associated pollution problems of ash disposal, the biological effects of effluent gases and the sylvan ecosystem surrounding the thermal plants to arrive at remedial measures to be taken.

To optimally utilize the land mass of Uttar Pradesh, the symposium suggested that land use studies should receive highest priority. It also suggested the establishment of an Institute of Rural Land Utilisation and Agricultural Development which should deal with all aspects of rural land use, livestock development, water logging, regional imbalances, *usar* land utilization, etc.

The symposium further suggested that the major river systems of the Ganga and the Yamuna should be investigated by establishing a separate institute for this purpose. The areas of activity suggested for the institute were physical and dynamic aspects of the rivers, flow of elements, problems of silting, river and ecosystems and manoeuvrability for transport, irrigation, and related areas.

Recognizing that modernization of traditional industries such as bangle, ceramics, brassware, carpet and chikan work is an important component of industrialization of Uttar Pradesh, the symposium desired action to further improve the literacy and technical education of artisans and craftsmen as well as to strengthen institutional facilities for supply of inputs and marketing their products.

Noting that the urbanization in the state had not reached the level of the national average, the participants felt that there are distinct problems in urban clusters which affect the quality of life. There is enough scope, the symposium observed, to utilize the already developed technology for low-cost housing and recycling of solid and liquid

wastes. It recommended, therefore, that the expertise available in university departments be utilized for studies relating to urban development planning.

Also recommended was that an integrated pest management programme for Uttar Pradesh be undertaken to control the use of toxic pesticides. This programme could utilize the available information on pesticide diffusion in the environment and toxic effects on non-target organisms.

Science museums should be established in at least all the important cities of the state to promote scientific literacy and scientific temper among the people.

The symposium also recommended the setting up of an independent Uttar Pradesh Association for the Cultivation of Science, which could play a significant role in the development of the state. □

New microbial culture for treating cyanide-bearing industrial wastes

A specific microbial culture, *Pseudomonas acidovorans*, which is capable of degrading cyanide has been isolated at the National Environmental Engineering Research Institute (NEERI), Nagpur. The researcher is Shri N. Shivaraman, who carried out the study under the guidance of Dr N.M. Parhad, head of NEERI's Microbiology Division.

Another organism tentatively designated as PCy 20 has been isolated which could degrade phenol in the presence of cyanide.

Cyanide is a constituent of a variety of industrial wastes, one of the major being electroplating industry's waste. Batch culture experiments on the influence of phenol on cyanide degradation showed that phenol inhibits cyanide degradation, while the mixed acclimatized microflora can degrade phenol in the presence of 26 mg/litre of cyanide. Cyanide degradation commenced after phenol was reduced to below 5 mg/litre. However, in the bench-model continuously-fed aeration system

with phenol-cyanide acclimatized microbial populations, both phenol and cyanide could be effectively degraded in a single-stage system operated at 12 hr detention time. The system was workable when phenol was in the range 250-716 mg/litre and cyanide at 100 mg/litre concentration in the influent.

The study has shown that there is considerable scope for using the biological process for treating cyanide-bearing wastes with soil microorganisms. Studies on the influence of organic nutrients and other secondary toxicants on microbial degradation of cyanide have given insight to deal with actual cyanide-bearing wastes.

Shri Shivaraman was awarded Ph.D. degree by the Nagpur University for his thesis based on the study. □

Action of drugs on collagen

The effect of steroid hormones, drugs, etc. on the interaction and biosynthesis of collagen has been studied by Shri P.K. Sehgal of the Central Leather Research Institute (CLRI), Madras.

Among the steroid hormones studied, progesterone showed maximum binding affinity to collagen, followed by methyltestosterones and testosterone. Hydroxy derivatives of progesterone showed lower binding affinities. Type III collagen exhibited greater affinity than type I to bind with each steroid hormone. Furthermore, it was found that physiological pH had greater effect on binding than acidic pH. Binding parameters were studied by the UV spectrophotometric method and compared with those of the equilibrium dialysis method.

Drugs like phenylbutazone, phenobarbitone, imipramine and riboflavin, which have high plasma half-lives, were found to bind with collagen with high binding affinity. Similarly drugs like adrenaline and aminophylline (theophylline), which have considerably low plasma half-lives, bind to collagen with low binding affinity.

Also studied was the effect of the long-term administration of certain

drugs, which are known to be MAO inhibitors, on the lysyl oxidase, the enzyme responsible for the formation of aldehyde cross-link intermediates in collagen. Isoniazid, an anti-tuberculosis drug which is also reported to possess MAO-inhibiting properties, was administered to a group of one-month-old albino rats for a period of 60 days. Collagen isolated from their skins was subjected to various physico-chemical tests. It was found that the activity of lysyl oxidase was inhibited in the experimental group as compared to that of control group of rats.

Shri Sehgal, who worked under the guidance of Dr K. Thomas Joseph, was awarded Ph.D. degree by the Madras University, Madras, for his thesis based on the studies. □

Boundary lubrication on wear mechanism of piston rings

On the basis of frictional behaviour of interacting machine surfaces, lubrication systems are divided into three main groups: hydrodynamic, elastohydrodynamic, and boundary. In the first case, the interacting surfaces are separated by a relatively thick lubricant film. There are surfaces in motion in which geometrical conformity is relatively low and the load is supported on a small area giving rise to high pressures so as to deform the surfaces elastically. This type of lubrication is called elastohydrodynamic lubrication.

In all the lubricated systems in which wear takes place, a region is encountered where a hydrodynamic or an elastohydrodynamic film cannot be maintained because of increased loads, decreased speeds and squeezing out of the lubricant. The situation in which these occur fall under the boundary lubrication regime. In this, a very thin adherent film permits relative sliding with some metal-to-metal contact between running surfaces. From wear considerations, the industrial applications of boundary lubrication are very wide and consequently investigations have been carried out in this area in the

past. The literature indicates scope for further theoretical and experimental investigations on the wear mechanism under boundary lubrication, considering the lubricant and metal substrate properties as the controlling parameters. These studies would help designers to select a matching lubricant-metal pair for optimum performance of machine components such as cylinder liners and piston rings.

Shri P.C. Nautiyal of the Indian Institute of Petroleum (IIP), Dehra Dun, has attempted to develop a suitable mathematical model for the analysis of wear characteristics of the piston ring; to identify the boundary lubrication regime experimentally; to study the frictional behaviour of piston ring and cylinder liner assembly on a simulated test rig using different lubricating oils and additives; to study the effect of engine operating parameters on top compression ring wear in an actual engine; and to correlate the experimental wear results of the predicted ones for the validity of the proposed model and to evaluate the unknown constants.

Experiments on the coefficient of friction were conducted on the modified Bowden Leben machine using actual segments of piston ring and cylinder liner. The engine selected for conducting wear investigations and generating other engine data was a Kirloskar AVI single cylinder, water-cooled, four-stroke, high-speed diesel engine rated at 5 hp at 1500 rpm. Irradiated cast-iron piston ring was fitted in the top groove of the piston and wear was measured using radiotracer technique. The lubricants tested were hexadecylamine in cetane and a commercial-grade crankcase lubricating oil.

The investigations have revealed that boundary lubrication conditions exist near the top dead centre region of the top piston ring. The analytical model developed for studies on wear of piston rings is able to predict the wear observed on the engine and shows that lubricants having higher energy of adsorption will remain effective up to higher temperatures, resulting in lower wear rates. The

energy of adsorption depends upon the nature and chain length of the lubricant molecules and the properties of sliding surfaces. The energy of adsorption and the coefficient of wear can be used as design criteria for wear of piston rings. The pressure-time diagrams, velocity profile of piston, temperatures near the top ring and duty parameter variations observed in a running engine clearly show that conditions are conducive to maximum wear severity near the top dead centre. The studies on coefficient of friction under conditions simulated to the top dead centre region of piston ring indicated that transition temperature plays a major role in causing breakdown of lubrication.

Shri Nautiyal, who carried out the investigations under the guidance of Shri S. Singhal of IIP and Prof. J.P. Sharma of Indian Institute of Technology, New Delhi, was awarded the Ph.D. degree by IIT for his thesis based on the studies. □

Structure and isomerization of some gaseous carbenium ions

Working at the National Chemical Laboratory (NCL), Pune, Shri Sudhakar Reddy, a CSIR research fellow, has established the gas-phase fragmentation reaction of some 3,5,6-triaryl-4-nitro- Δ' -cyclohexenylcarbenium ions by the MIKE and CA techniques. The effect of different C_4 substituents on the fragmentation modes has also been studied.

Evidences were obtained for the isomerization of triarylcyclopentenyl benzyl cation in the gas phase under chemical ionization conditions and under nitrous acid deamination conditions in solution. Kinetic energy release accompanying these isomerization processes were measured in the gas phase. Data were obtained for the equilibration of the triarylcyclohexenylcarbenium ions and the corresponding diphenylcyclopentenyl benzyl carbenium ion in the isolated phase from kinetic energy and CA measurements.

The structures of $(C_6H_6O)^+$ ions generated from many precursors by

different ionization modes and formed by fragmentation were established from the evidence obtained from MIKE, CA and kinetic energy release data. The results suggest that these ions partly isomerize to a common structure.

MECHANISM OF IMMUNOSUPPRESSION IN DENGUE VIRUS INFECTION

Bhatnagar Prizewinner Dr Chaturvedi's work

A pioneer in viral immunopathology research, Dr Chaturvedi has made significant contributions in the field of dengue virus infections, which include: (i) demonstration of a state of reduced immune response (immunosuppression) in infected host; (ii) discovery of the



production of a cytotoxic factor in the spleen which kills macrophages and T lymphocytes of the host *in vitro* and *in vivo*; (iii) reproduction of a state of immunosuppression, similar to that by the virus infection, by administration of the cytotoxic factor to the normal host; (iv) demonstration of reduced phagocytic activity of monocytes and ability of T lymphocytes of human blood to form SRBC-rosettes after treatment with the cytotoxic factor, which explains similar findings in human infections; (v) discovery of an antigen-specific suppressor factor produced in the spleen of the virus-infected host; (vi) demonstration that the suppressor factor acts on another subpopulation of T lymphocytes to produce secondary suppressor cells which mediate antigen-specific suppression through production of prostaglandin.

Dr U.C. Chaturvedi, Reader & Head of Virology Division, Postgraduate Department of Pathology and Bacteriology, K.G. Medical College, Lucknow, has been chosen for the 1981 Shanti Swarup Bhatnagar Prize in medical sciences [CN, 31(1981), 177].

Shri Reddy, who worked under the guidance of Dr K.G. Das of NCL's Organic Chemistry Division, was awarded Ph.D. degree in 1981 by the University of Poona for his thesis based on the studies. □

phocytes to produce secondary suppressor cells which mediate antigen-specific suppression through production of prostaglandin.

On the basis of his findings Dr Chaturvedi has proposed a dual mechanism of immunosuppression in dengue virus infection. The body appears to make an effort to restrict and eliminate the virus which replicates mainly in macrophages. To achieve this the virus stimulates a subpopulation of T lymphocytes to produce the cytotoxic factor which kills a large number of macrophages and some of the T lymphocytes. Those cells which escape killing are adversely affected functionally, e.g. phagocytosis by macrophages and rosetting by T lymphocytes. The result of this is immunosuppression of those functions which are mediated by macrophages and helper and effector T lymphocytes. Since this suppression is mediated by elimination of cells it is non-specific and is directed against heterologous antigens like sheep erythrocytes also.

Another effect of the killing of macrophages by the cytotoxic factor is that a large amount of the virus antigen (it replicates actively in the spleen) is presented to the immunologically reactive cells and stimulates production of suppressor T cells. These cells mediate suppression in two steps. The suppressor T cells produce a soluble suppressor factor which acts on another subpopulation of T lymphocytes to produce prostaglandin which finally mediates suppression. This type of suppression is virus-specific and is not against SRBC, Japanese encephalitis or Coxsackie B₄ viruses. Thus the two

factors combine together to produce a state of immunosuppression.

At the virus laboratory in the Postgraduate Department of Pathology and Bacteriology of the K.G. Medical College, Lucknow, Dr Chaturvedi and his coworkers have shown for the first time the precise mechanism of immunosuppression mediated by factors induced by a microbe. This opens up a new field of investigation using other virus models. So far macrophages were considered to be the main source of prostaglandin but now antigen-specific prostaglandin produced by T lymphocytes as well has been shown. The demonstration of microbial antigen-specific cooperation between two subsets of T lymphocyte populations is a unique phenomenon and is of far-reaching consequences. The causes of haemorrhage and shock, seen in severe dengue virus infection, are not known. They may be caused by the killing of the megakaryocytes and granulocytes by the cytotoxic factor. The prostaglandins are known to cause multiple effects in the body. Demonstration of suppressor factor induced production of prostaglandin provides a new angle to the interpretation of various manifestations of dengue syndrome. Further, Dr Chaturvedi's work shows that extreme caution is needed before an effort is made to vaccinate the population against dengue virus because the vaccine may cause immunosuppression, making individuals more susceptible to other infections. The work opens up an absolutely new area of research where effort may be made to reduce or abolish the production of cytotoxic and suppressor factors, thereby minimizing the ill-effects of the dengue virus infection.

Dr Chaturvedi heads a very active virus laboratory of the country which has made significant contributions from time to time in the areas of poliomyelitis, respiratory viruses, congenital malformations, acute haemorrhagic conjunctivitis, and Japanese encephalitis virus infections.

Dr Chaturvedi (born 2 March 1939) has had a brilliant academic career at the K.G. Medical College, Lucknow, where he obtained M.B.B.S. degree in 1961. He then joined the Postgraduate Department of Pathology and Bacteriology and obtained M.D. degree. He is working as Reader and head of the Virology Division since 1967. He had been to England on a Commonwealth medical fellowship for 10 months and thrice to the Federal Republic of Germany on an Alexander von Humboldt fellowship. He has published 110 technical papers. For his original research work he was awarded membership of the Indian Academy of Medical Sciences (M.A.M.S.) in 1971; membership of the Royal College of Pathologists, London (M.R.C.Path.) in 1974; Shakuntala Amichand Prize of the Indian Council of Medical Research (ICMR) in 1969; and the J.B. Srivastava Memorial Oration Award, also of ICMR, in 1979. □

PROGRESS REPORTS

NCL Annual Report : 1979-80

The development of a simple and economic process for isolation of the anti-cancer drug vinblastine from *Vinca rosea*, of a shorter route for the synthesis of aglycone of an adriamycin analogue, and isolation of an active principle showing ovipositional deterrence from *neem*, are some of the important pieces of work of the National Chemical Laboratory (NCL), Pune, according to the laboratory's annual report for 1979-80 published recently. The report also reveals that the laboratory collaborated with the Hindustan Organic Chemicals Ltd in setting up a pilot plant for 1,4-butenediol. Based on pilot plant evaluation of the NCL process for ethylenediamine, a new company, Diamines and Chemicals Ltd, had been formed that was expected to set up a 860 tonnes/annum commercial plant. A 150 tonnes/annum plant for dimethoate was commissioned by Mico Farm Chemicals Ltd at Mettur Dam. Semi-commercial plants for dimethoate and ethion were

commissioned by Shaw Wallace & Co. at Haldia. Jyoti Refineries commenced trial production, based on NCL process, of silver paste for mica capacitor electrodes at Nagpur.

A catalyst was developed for vapour-phase oxidation of toluene to benzaldehyde. Tested continuously for a period of 1000 hr, the catalyst yielded constant catalytic activity and selectivity. Kinetic data were collected and a computer simulation programme was developed to study the effect of recycling the overall process. A single-tube reactor has been designed with recycle and recovery systems for carrying out further investigations.

The operation of NCL's pilot plant for methylchlorosilanes was demonstrated to the representatives of Hico Products Ltd and Humphreys and Glasgow Consultants (P) Ltd. NCL also prepared designs for an integrated pilot plant of 90 tonnes/annum for Hico Products Ltd.

After successful completion of laboratory-scale investigations on a three-step process for the preparation of hexachlorocyclopentadiene, a pilot plant (3 kg/hr) was designed and erected. During the operation, several modifications were carried out to reduce the formation of tarry products, and process conditions were established in experiments lasting 4-6 hr. A flow-sheet, a lay-out of the plant and a scale-model were prepared for the proposed 600 tonnes/annum plant at the site of HOCL, Rasayani.

A pilot plant (5 kg/batch) for theophylline was erected and operated successfully and a product of desired specifications obtained.

The process conditions for the preparation of triethylorthoformate were standardized and the chemical was reacted with diethyl malonate to yield ethoxymethylene malonate. Exploratory investigations were carried out for the synthesis of novoldiamine. Ethoxymethylene malonate and novoldiamine are the main intermediates for the preparation of the antimalarial drug chloroquine.

In plant tissue culture, multiplication of 100-year-old elite teak trees was achieved for the first time. Methods for clonal multiplication of turmeric, ginger and sugarcane were also standardized. Mosaic virus-free sugarcane setts grown at NCL as a foundation stock on a 0.75-acre were supplied to a number of institutions for large-scale field trials. In all these trials the yields were 15-20% higher than those obtained from infected controls.

The laboratory prepared high-silica zeolites from indigenously available raw materials and characterized them by X-ray diffraction, thermal sorption and chemical analysis. These were tested for the conversion of ethanol/rectified spirit to gasoline and BTX aromatics over the temperature range 300-500°C.

The laboratory developed a simple and convenient method for the isolation, from *Vinca rosea*, of vinblastine as its sulphate. The patented process does away with chromatographic procedures.

Production plant trials for 6-APA manufacture were carried out at Hindustan Antibiotics Ltd, Pune, with the immobilized penicillin acylase system developed at NCL in collaboration with the firm. The production-scale runs confirmed the reuse potential and efficiency of the system established earlier in pilot plant trials.

Starting from indigenously and abundantly available and cheap raw material (+)-3-carene, the synthesis of three new active insecticidal esters of 3-phenoxybenzyl alcohol was achieved.

An important project being pursued in materials science is the development of materials for solar energy utilization. The technique of using 'spin-on' coatings in the fabrication of solid-state devices is likely to make these devices, including solar cells, much simpler and cheaper to fabricate. Emulsion compositions developed for p-type doping in silicon (borosilicon type) were tested at the Central Electronics Ltd and their performance was reported to be very good. Similarly, phosphoro-film em-

ulsions for n-type doping have been prepared.

The alkoxy ethanols developed by NCL for water evaporation control when used in large-scale experiments carried out in the Indira percolation tank near Khed and other tanks gave a 30-35% saving of water if wind velocity was not greater than 15 km/hr. Various W/O/W multiemulsion systems containing different polymers such as PVA, Cellocel and HTPB were prepared with 2.5% of active material to get a film which could withstand wind velocity greater than 15 km/hr. The emulsions containing HTPB resulted in 55-60% reduction in water evaporation at a wind velocity of 30 km/hr.

The total number of NCL processes in production during 1979-80 was 65 with a turnover worth Rs 292.370 million as against 68 processes with a turnover worth Rs 217.406 million during 1978-79. The foreign exchange saving on account of the production in 1979-80 is estimated at Rs 117.288 million. The laboratory's total financial inputs for 1979-80 were Rs 27.797 million and the receipts (through premia/royalties, consultancy services, etc.) for the same period amounted to Rs 1.477 million.

Fourteen patents were filed in India, and two abroad, one each in UK and The Netherlands. One hundred and twenty-five research papers were published. □

PERSONNEL NEWS

Appointments/Promotions

Dr P.V.R. Subrahmanyam

The promotion of Dr P.V.R. Subrahmanyam of the National Environmental Engineering Research Institute (NEERI), Nagpur, as Scientist EII has been announced [CN, 31 (1981), 167].

Dr Subrahmanyam (born 15 July 1932) obtained master's degree in applied chemistry with first class first position, and D.Sc. in sanitary chemistry from the Andhra University in 1961.

With NEERI since December 1964, Dr Subrahmanyam has specialized in water pollution control and wastewater treatment. He was temporary adviser to WHO (EURO) and UNEP for Working Group meeting held at Garmisch-Partenkirchen, West Germany, during March 1981 for preparing guidelines for toxic and other hazardous wastes. In June 1981, he visited USA and UK in connection with the Indo-US binational project and participated in the International Conference on Water Industry 1981, held at Brighton, UK.

Dr Subrahmanyam visited Malaysia, Singapore and Sri Lanka in 1976 on UNEP project work. He has to his credit 45 research papers and 60 technical reports. □

* * *

Shri S.R. Kshirsagar

The promotion of Shri Shrikrishna Ragunath Kshirsagar of the National Environmental Engineering Research Institute (NEERI), Nagpur, as Scientist EII has been announced [CN, 31 (1981), 167].

Shri Kshirsagar (born 7 Aug. 1927) obtained first class master's degree in public health engineering from the Roorkee University in 1962 and diploma in sanitary engineering from Delft, The Netherlands, in 1967.

With NEERI since 1963, he was for some time the head of NEERI's Bombay zonal laboratory. He is at present the head of the Technology Demonstration Division, and Rural Sanitation and Sewage Utilization Cells.

Shri Kshirsagar has specialized in low-cost waste treatment and wastewater recycling for industrial and agricultural use.

He is a fellow of the Institution of Public Health Engineers, UK, life member of the Institution of Engineers (India) and Indian Water Works Association, and member of the Indian Association for Water Pollution Control, and of Marathi Vidyan Parishad. Has 25 papers/reports and two books to his credit. □

Honours & Awards

Dr A.G. Datta of IICB elected
INSA fellow

Dr Asoke G. Datta of the Indian Institute of Chemical Biology, Calcutta, has been elected fellow of the Indian National Science Academy. This honour is in recognition of his original contributions to the biosynthesis of thyroxine in extrathyroidal tissue.



After obtaining his Ph.D. degree from the Calcutta University Dr Datta worked as a postdoctoral fellow at the National Research Council of Canada. Here he showed that in *Acetobacter melanoginun*, glucose, without being phosphorylated, could be oxidized to α -ketoglutarate via several 6- and 5-carbon intermediates. He proposed a new alternative pathway of carbohydrate metabolism in this organism. Moving to USA in 1957, he worked with the famous enzyme chemist Dr Efraim Racker at the Public Health Research Institute of the City of New York on the mechanism of enzyme action. After demonstrating that the glycolaldehyde-enzyme complex participates in transketolase-catalyzed reaction, he isolated the enzyme-glycolaldehyde complex. He also showed that the enzyme-glycolaldehyde complex was active and that the glycolaldehyde moiety could be transferred enzymatically to the acceptor to form the product.

Returning India, he worked as a Pool Officer at the Bose Institute, Calcutta, before joining IICM. He and his associates at IICM have found that erythrose, a 4-carbon sugar, strongly inhibits the growth of *Vibrio cholera*,

both in culture medium and in the gut of live animals. They have further established that the growth inhibition is due to blocking of glucose entry into the live vibrio by erythrose. Dr Datta's group was the first to demonstrate the *in vitro* biosynthesis of erythropoietin, a kidney hormone responsible for the regulation of erythropoiesis. However, his major contribution is the discovery of a new pathway of thyroxine biosynthesis in an extrathyroidal tissue, like the submaxillary gland.

Dr Datta has published about 30 original papers, and guided about a dozen students for Ph.D. He is a fellow of the Indian Academy of Sciences, Bangalore, and recipient of B.N. Chopra Award for 1980 of INSA.

He has twice been invited as visiting scientist by the Roche Institute of Molecular Biology, USA, and once as visiting professor by the Ohio State University at Columbus, USA.

One of his current research interests is utilization of waste materials. □

Dr Rajendra Kumar of the National Metallurgical Laboratory, Jamshedpur, has been elected chairman of the Jamshedpur centre of the Institution of Engineers (India).

PATENTS INFORMATION

Indian Pat. 148614

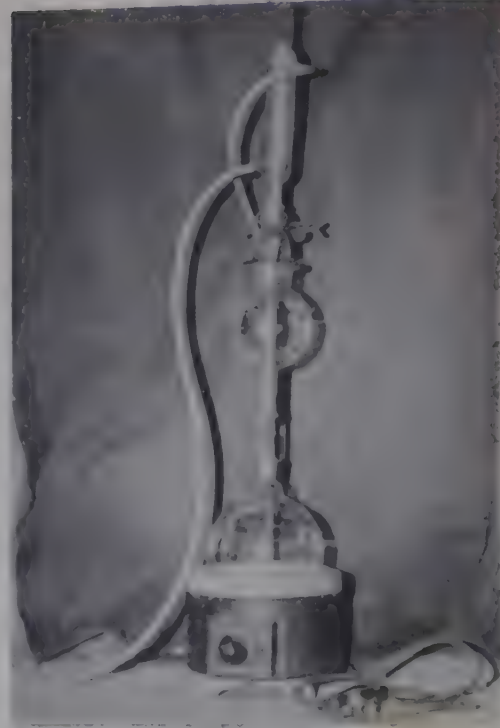
(Application No. 514/Del/77)

An improved new all-glass extraction apparatus

N.K. Das & S.C. Basa

Regional Research Laboratory, Bhubaneswar

The new all-glass solid-liquid extraction apparatus, designed and developed, and covered by the patent, differs from the conventional Soxhlet apparatus in that the solvent vapours, once generated after the heating of the solvent, directly reach the condenser through an adapter and cannot condense prior to that. Hence extraction time is reduced, and, as a result, more number of extractions can be done during the same time interval. The materials are handled easily through a flange and are always at a slightly higher temperature thus reducing the time of extraction.



The patented all-glass solid-liquid extraction apparatus—more efficient and less costly than the conventional Soxhlet apparatus

Furthermore, it is easier to fabricate this apparatus than the conventional one as a fewer number of ground-glass joints are needed. The cost of fabrication is also lower. □

PATENTS FILED

573/Del/81: Process for the manufacture of a foil-type resistance strain gauge device, B.S. Dasannacharya, K. Krishnamurthy, & (Smt) Indira Rajagopalan—National Aeronautical Laboratory, Bangalore.

630/Del/81: Improved process for the disproportionation of toluene to benzene and xylenes, P. Ratnasamy, S.B. Kulkarni, G.P. Babu, K.H. Chandawar, I. Balakrishnan & V.P. Shiralkar—National Chemical Laboratory, Pune.

175551/1981 (Japan): Substituted phenacyl anthranilates and process for preparation thereof, N. Bhanumathi & P.B. Sattur—Regional Research Laboratory, Hyderabad.

666/Del/81: An improved process for the desulphurization of ferrous melts in the iron and steel industry, D.J. Chakrabarti, S.K. Biswas & V.A. Altekar—National Metallurgical Laboratory, Jamshedpur. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

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Beehive ovens technology released to yet another firm

The technical know-how for the construction of a battery of eight beehive ovens of improved design developed by the Central Fuel Research Institute (CFRI), Dhanbad, was provided to Delta Enterprises Ltd, Govindpur, Dhanbad. At the request of the firm, services were also provided for heating up and commissioning the plant, standardizing the operating conditions, and training of the plant personnel in oven operation. This plant is now in normal operation.

The improved design of beehive oven was developed by CFRI in 1972 to meet the shortage of metallurgical coke caused by the breakdown of the byproduct coke ovens at Jamshedpur. In 1972-73, Tata Iron & Steel Co. Ltd installed and operated successfully 352 ovens of the CFRI design at Sijua, with an annual coal carbonizing capacity of 4 lakh tonnes at a capital investment of Rs 12 million. So far CFRI has released the technical know-how of improved beehive oven to eight parties by charging Rs 1.28 lakh. In addition, nearly 800 ovens have been installed by 60 different private organizations at different places in the country. At present, coke worth about Rs 500 million per annum is being produced from improved beehive ovens of CFRI design.

The main advantages of the improved beehive coke oven developed by CFRI are:

*With only a marginal increase in the construction cost, the productivity of the oven increases three-fold.

*Because of the faster rate of coking achievable in the improved beehive ovens it has become possible to get coke of better quality from coals with deficient coking properties.

*The loss of coke inside the oven due to combustion has also been reduced to a minimum, which contributes to a higher yield of saleable coke.

*The improved beehive coke oven can ensure trouble-free operation at a uniform temperature and helps cut down the production of off-grade coke.

*The ovens can be constructed entirely from indigenous materials. □

CECRI Extension Centre at Cochin

An extension centre of the Central Electrochemical Research Institute (CECRI), Karaikudi, has started functioning at CSIR Cochin Complex, South Kalamassery 683104. While serving principally as a centre for demonstrating the processes developed at CECRI, the extension centre will also act as trouble-shooter. It will, besides, refer to CECRI for solution industries' problems in the field of corrosion, electroplating and metal-finishing, chemicals, batteries, and electrometallurgy. The centre's other functions include the testing of batteries and arranging for large-scale trials in industrial units of the laboratory-scale processes developed by CECRI.

The Scientist in charge of the extension centre is Dr N.V. Parthasaradhy. □

Kinetics of decomposition of free radical initiators

Shri M.G. Kulkarni of the Chemical Engineering Division of the National

Chemical Laboratory (NCL), Pune, has investigated the influence of the chemical nature and the viscosity of the medium on the kinetics of decomposition of free-radical initiators. The aim was to develop a general framework by which the influence of these two parameters could be analyzed.

Azobisisobutyronitrile (AIBN) was chosen as a typical multibond initiator in which decomposition occurs by simultaneous scission of two C-N bonds. Analysis of the data on decomposition kinetics in different solvents based on extrathermodynamic consideration reveals that the solvent plays an important role in the kinetics of decomposition. The apparent insensitivity to the nature of the solvent was shown to be a manifestation of compensation effects. These conclusions were confirmed by studying the kinetics of decomposition in mixed solvents. Mechanistic considerations predict that viscosity should have no influence on the decomposition constant of AIBN. This was confirmed by studies in viscous media such as

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dimethylformamide-glycerol blends, and polyethylene solutions in trichlorobenzene, in which the initiator is soluble. However, media in which AIBN has limited solubility impose external diffusional limitations and falsify the kinetics. Initiator decomposition followed zero-order kinetics in contrast to first-order kinetics observed in the absence of such limitations. *p*-Nitrophenylazotriphenylmethane was chosen as a typical single bond initiator. In this case, decomposition occurred by cleavage of one C-N bond at a time and was retarded by increase in the viscosity of the medium. The decrease was more

drastic in the case of a viscogen such as glycerol than in the case of a polymer. In order to develop a unified approach, the concept of microviscosity was introduced and the results were quantitatively correlated within the framework of the Smoluchowski model. It was for the first time that the concept of microviscosity put forth in the literature was put to test and its utility demonstrated.

Shri Kulkarni, who worked under the guidance of Dr L.K. Doraiswamy, was awarded Ph.D. (Tech.) degree by the University of Bombay for his thesis entitled 'Role of Transport Processes in Free Radical Reactions'. □

FILTERING AND SIGNAL PROCESSING: ANALOG AND DIGITAL

Bhatnagar Prizewinner Prof. Dutta Roy's work

Prof. Dutta Roy has made significant original contributions in fundamental as well as applied aspects of filtering and signal processing, using both analog and digital techniques.



With the rapid advances in integrated circuit (IC) technology and the availability of low-cost digital hardware as IC chips, digital signal processing has been a very dynamic and active field of research during the past decade. Prof. Dutta Roy has contributed several new techniques in this field for improving the computational efficiency and reducing the finite word-length errors, and for implementing single parameter controlled variable digital filters as required

in speech processing and spectrum analysis. Two conceptually simple, but computationally superior, techniques were proposed by him for the calculation of roundoff noise. He applied the pseudo-Boolean techniques for solving the problem of quantized coefficient design of finite impulse response (FIR) as well as infinite impulse response (IIR) filters, with reduced computer time and improved accuracy. He proposed a new, computationally efficient matrix formulation of the discrete Hilbert transform (DHT) and applied it to the design of digital low-pass filters, with the additional advantages of less storage requirement and better noise performance. He evolved a new nested structure for the FIR filter, which is relatively insensitive to finite word-length effects and applied it to implement a DHT. He solved the problem of delay-free loops, arising in variable IIR filters, by a novel computational scheme; in the FIR case, he proposed several new and powerful transformations for variable cutoff low-pass filters as well as bandpass filters with variable bandwidth or centre frequency.

Prof. Dutta Roy's work in analog filtering and signal processing includes distributed networks, active filters and charge-coupled devices. His contributions to distributed networks are concerned with the modelling, analysis and applications of such networks in filtering, pulse compression and impedance matching. He developed rational and accurate two-port models for the distributed RC and LC networks and extended them to model solid-state devices. He obtained, for the first time, explicit formulas for the two-port parameters of cascaded transmission line networks with stubs, which is the most commonly used configuration for microwave filtering and impedance matching. He extended the Ruthroff connection of transmission lines for impedance matching to nonuniform lines and achieved very large bandwidths. He also obtained a transmission line configuration which achieves maximum or near maximum power transfer between unequal impedances in a frequency-independent or all-pass manner. This had been considered an impossible proposition till then and is expected to have a great impact on high frequency circuit design.

Compressing a voltage pulse is of interest in several pulse communication and instrumentation situations. That a single nonuniform line can achieve the limiting value of compression, viz. to an impulse, and that this performance can be approximated to a prespecified degree of accuracy in practice is a valuable contribution of Prof. Dutta Roy.

The charge-coupled device (CCD), although a decade old, has proved to be uniquely suitable for many analog signal processing situations, but its applications have so far been limited owing to the charge transfer inefficiency (CTI), which causes magnitude as well as delay distortions. Prof. Dutta Roy's work on CCD has been primarily concerned with the compensation of CTI by two new techniques. One of them, called the feedback technique,

Prof. S.C. Dutta Roy, Department of Electrical Engineering, Indian Institute of Technology, New Delhi, has been named recipient of 1981 Shanti Swarup Bhatnagar Prize in engineering sciences [CN, 31(1981), 177].

although technologically involved, can achieve exact compensation. The other, called the predistortion technique, is simpler, but it achieves limited compensation and is applicable to CCD delays only; the concept, however, is useful in the measurement of CTI.

Notable contributions of Prof. Dutta Roy in other aspects of filtering and signal processing include an elegant method of sensitivity calculation in active filters, a network synthetic approach to variable frequency oscillators, and new approximations for transitional and sharp cutoff filters.

Born on 1 November 1937, Prof. Dutta Roy had a brilliant academic career, securing the first rank in the university in I.Sc. (Dacca, 1954), B.Sc. (Hons) in physics (Calcutta, 1956) as well as M.Sc. (Tech.) in radio physics and electronics (Calcutta, 1959). He obtained the D.Phil. degree in 1965 from the Calcutta University for his research on network theory and solid-state circuits.

He worked with the Geological Survey of India, the River Research Institute, the University of Kalyani, and the University of Minnesota, USA, before joining IIT, New Delhi, in 1968. He has been a Professor of Electrical Engineering at IIT since January 1970 and was the chairman of the department during 1970-1973. During 1973-1974, he was a visiting professor at the University of Leeds, England, and during 1978-1979, he was a visiting fellow at the Iowa State University, USA.

Prof. Dutta Roy is a fellow of the Institution of Electronics and Telecommunication Engineers (IETE), honorary editor of *Journal of the Institution of Electronics and Telecommunication Engineers*, and a member of the editorial board of *International Journal of Circuit Theory and Applications*. He was awarded the 1973 Meghnad Saha Memorial Prize by IETE, and has recently been named recipient of the 1981 Ram Lal Wadhwa Gold Medal, also of IETE. □

CHLOROPLAST MEMBRANE STRUCTURE AND FUNCTION

Bhatnagar Prizewinner Dr Sane's work

Dr Sane has made significant contributions in the field of chloroplast membrane structure and function. The light-induced electron transport in the chloroplast is carried out by two



photosystems located in the inner membrane of the chloroplast. Dr Sane's earlier work with Prof. Park, at the University of California, Berkeley, USA, had established the location of these two photosystems in the membrane.

Dr Sane has extended the earlier work and developed concepts regarding the topography of the chloroplast membrane. He suggested that the differentiation of the membrane into appressed and non-appressed regions was not only related to the differential distribution of the photosystems but also to the location of two enzymes—the nicotinamide adenine dinucleotide phosphate reductase and adenosine triphosphate synthetase. These two are absent from the appressed region and are located only on the surface of the stroma membranes. The model suggested by him on the basis of these concepts provides an explanation for

the formation and rôle of appressed regions (the grana). Several biochemical and ultrastructural studies have provided support for the model he proposed.

The light-induced electron transport is associated with proton transport across the membrane. Using the inhibitor dicyclohexylcarbodiimide, which is known to block proton efflux from the chloroplast membranes, Dr Sane showed that the proton movement across the membrane during electron transport may be mediated by certain proteins. These were designated as proton translocating proteins. He postulated the presence of two such proteins that help in the reduction and oxidation of plastoquinone—an electron transport component requiring protons besides electrons for its function.

Dr Sane and his group have studied extensively the temperature-induced light emission from photosynthetic membranes. This light emission provides information about the energy storage during electron transport. The relationship between the light emitted at different temperatures and electron transport has been elucidated. This information has provided convincing evidence for the participation of photosystem I (the long wavelength absorbing photosystems) in light emission. Further, these studies have shown that there are at least five energy storage states associated with the photosynthetic membrane. The mechanism of temperature-induced light emission and delayed light emission from photosynthetic membranes and their interrelationship has been worked out.

Besides the chloroplast membranes, Dr Sane and his group are studying the regulation of enzymes involved in CO₂ fixation by chloroplasts. They have investigated the reasons for the higher photosynthetic efficiency of C-4 crops like maize and sugarcane as compared to C-3 crops like rice and wheat. In addition, the regulation, activation and

Dr P.V. Sane of the Bhabha Atomic Research Centre, Bombay, has been chosen for the 1981 Shanti Swarup Bhatnagar Prize in biological sciences (along with Dr Sushil Kumar of the Indian Agricultural Research Institute, New Delhi) [CN, 31 (1981), 177].

inactivation of the enzyme ribulose-1,5-bisphosphate carboxylase/oxygenase has also been studied. A thorough understanding of the functions of this enzyme may help in devising strategies for improving crop productivity.

Dr Sane (born 24 Dec. 1937) obtained his M.Sc. in agriculture from the Nagpur University in 1960. After working as an Extra Assistant Director in the Indian Standards Institution from 1961 to 1964, he went to Canada on a Commonwealth scholarship and obtained his Ph.D. in plant

biochemistry from the University of Alberta, Edmonton, in 1968. He was an Assistant Research Botanist at the University of California, Berkeley, USA, from 1968 to 1971 and a Guest Scientist of the European Molecular Biology Organisation in 1971 at the Ruhr University, Bochum, FRG. He joined BARC's Biology and Agriculture Division in 1972. During 1979-80, he worked at the Ruhr University, again as a fellow of the Alexander von Humboldt Foundation. Dr Sane is a fellow of the Maharashtra Academy of Sciences. □

CHEMISTRY IN THREE-DIMENSIONAL SPACE

Bhatnagar Prizewinner Prof. Deb's work

The central theme in Prof. Deb's research work has been the predictive and interpretive significance of electron density in chemistry. Along with several workers in other countries he has highlighted the need to develop interpretive techniques in quantum chemistry and physics which would enable one to visualize what atoms,



molecules and solids are 'doing' in three-dimensional space. His main interest has been to develop new concepts and methods, with the electron density as the basic variable rather than the wave function, for dealing with chemical binding, molecular structure, properties and interactions.

Deb *et al.* have developed a versatile model of molecular geometry which

Prof. B.M. Deb of the Department of Chemistry of the Indian Institute of Technology, Bombay, has been chosen (along with D. Balasubramanian of the Centre for Cellular & Molecular Biology, Hyderabad) for the 1981 Shanti Swarup Bhatnagar Prize in chemical sciences [CN, 31 (1981) 177].

regards molecular shapes to be determined primarily by the electron-nuclear attractive forces arising from the electron density in the highest occupied molecular orbital (HOMO) postulate; the forces can themselves be obtained by using the Hellmann-Feynman theorem. The model can qualitatively answer questions dealing with all static aspects of the geometries of small- and medium-size molecules and can also predict the shape of large molecules based on those of their fragments. It has been employed to predict equilibrium shapes, changes in bond lengths, valence angles, stretching and bending force constants, etc. for AH_2 , AH_3 , AH_4 , AH_5 , AB_2 , AB_3 , AB_4 , AB_5 , HAB , H_2AB , HAB_2 , ABC , B_2AC , $HAAB$ and $BAAB$ molecule classes. In subsequent approximate valence MO calculations on 17 hypothetical molecules, the model turned out to be the most successful among all the current important qualitative models of molecular geometry. These molecules are: $HCLi$, HBB_e , $HBLi^-$, HCB , HNB_e , HNB^+ , HBB^- , $NaHLi^+$, LiB_2^+ , $MgBe_2$, LiB_2^- , MgB_2 , LiH_3^+ , H_3O^- , CH_5^- , HBO_2^{2+} and HBF_2^{2+} . The calculations reveal rather interesting structural features and serve as future comparisons when some of these molecules might be synthesized in the laboratory.

Deb and his coworkers have also introduced a generalized concept of internal stresses as an alternative way of studying molecular and solid-state behaviour. The stress tensor arises from internal fields owing to the nuclear and electronic distributions and has the same form as that of Maxwell's stress tensor for classical electromagnetic fields. This permits 'classical' interpretations of molecular and solid-state phenomena in three-dimensional space, especially the interaction between two many-electron systems. A detailed study of chemical binding in H_2 and H_2^+ molecules has been made by studying local variations in electrostatic pressure and various force densities from point to point as two interacting systems approach each other. This yields new insights into chemical binding and molecular interactions.

The molecular stress tensor has been given a more fundamental interpretation within the local density-functional theory of Hohenberg, Kohn and Sham. The covariant derivative of the stress tensor vanishes for static stationary states to ensure the stability of the system. The comprehensive stress tensor has been shown to consist of kinetic, electrostatic, exchange and correlation contributions. It occurs in the Euler or Navier-Stokes equation for the motion of the electron fluid. This interpretation provides a triangular link between density-functional theory, quantum fluid dynamics and the concept of internal stresses in molecules.

The works have been carried out in collaboration with Dr (Smt) Geeta D. Mahajan, Dr (Smt) Anjali S. Bamzai, and Shri Swapan K. Ghosh.

Deb has also made other significant contributions in quantum chemistry. Through review articles he has highlighted the vitally important roles of electron density and forces in chemistry. He has edited a reference book *The Force Concept in Chemistry* (Van Nostrand Reinhold Company, New York, 1981).

Born on 27 September 1942, Deb had

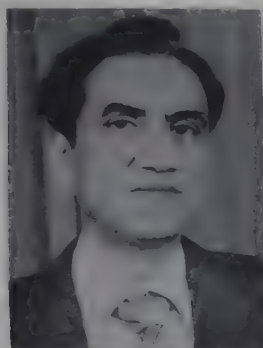
school and early college education in the erstwhile East Pakistan. He obtained his B.Sc. in chemistry (Hons) from the Presidency College, Calcutta, in 1961 and his M.Sc. in pure chemistry from the University College of Science, Calcutta, in 1964. After a year's stay with the late Prof. S.R. Palit at the Indian Association for the Cultivation of Science (IACS), Calcutta, he went to the Mathematical Institute, University of

Oxford, on a Commonwealth scholarship. His postgraduate diploma in advanced mathematics and D.Phil. in theoretical chemistry were done under the supervision of the late Prof. C.A. Coulson, F.R.S. Upon his return he joined IACS as a Pool Officer. Subsequently he joined IIT, Bombay, as a lecturer in chemistry, and became assistant professor in 1973 and professor in 1978. □

STATISTICAL INFERENCE

Bhatnagar Prizewinner Prof. Ghosh's work

Prof. Ghosh has contributed to various areas of statistical inference. One of his outstanding recent contributions is the pioneering work that he has done in the development of a very rich theory of second order efficiency arising from the work of C.R. Rao in the early sixties and that of R.A. Fisher in the early twenties.



Prof. Ghosh has shown that for all distributions satisfying certain weak regularity conditions (and not merely the multinomials of Fisher and Rao) and for very general loss functions a bias adjusted maximum likelihood estimate enjoys this property. (This is an extension of the beautiful result proved by Rao for multinomials with squared error loss.) The proof of this required, among other things, the development of an appropriate expansion for the distribution function of a large class statistics which are asymptotically normal; included in this class are the so-

called Fisher consistent estimates. The fact that such an expansion exists settled an old conjecture in statistical theory. Moreover the technique developed for this led to a solution of another long-standing problem—namely the justification of frequently used expansions for the likelihood ratio and numerous other similar statistics which are asymptotically distributed as chi-squares.

Prof. Ghosh has also contributed significantly to the problem of sufficiency in the undominated case and the identification problem in competing risk theory. His recent work in sedimentology has explained to a large extent the occurrence of unimodality, symmetry and long-normality in suspended grain-size distribution.

Earlier, he had proved under very general conditions that in reducing a problem by sufficiency and invariance, the order in which these criteria are applied is immaterial. Among other things, this fact is the basis of one of the most powerful ways of constructing a sequential test of composite hypotheses.

Prof. Ghosh has obtained many of these results in collaboration with several students and colleagues among whom special mention must be made of R.N. Bhattacharya, T. Chandra, W.J. Hall, S. Sengupta and R.A. Wijsman.

Born in Calcutta on 22 May 1937, Prof. Ghosh went to Presidency College and Calcutta University for his graduate work. He received his D. Phil. from this

university in 1964 under the guidance of Prof. H.K. Nandi. He has taught at Calcutta, Illinois, Pittsburgh and several other universities abroad. Since 1970 he has been a professor at the Indian Statistical Institute. Currently he is the Professor in charge of the Division of Theoretical Statistics and Mathematics. He has been on the editorial board of *Annals of Statistics*, *Sankhyā*, *Bulletin of the Calcutta Association*, *Communications in Statistics*, and the forthcoming German journal on 'Stochastics and Decisions'. He is a fellow of the Indian National Science Academy. He is also a fellow of the Institute of Mathematical Statistics (USA) and a life member of the Calcutta Statistical Association. As recipient of a JSPS (Japanese Society for Promotion of Science) visiting professorship grant in 1977, he undertook a lecture tour of the leading universities in Japan. □

PROGRESS REPORTS

CSIR Annual Report: 1980-81

The annual report of the Council of Scientific & Industrial Research for 1980-81, published recently, records the progress of work of the Council principally under the following heads: Research utilization, Resource development, Electronics and instrumentation, Chemicals and chemical engineering, Post-harvest and other agro/biotechnologies, Energy, Machinery development, Surveys & analyses, and Dissemination of information.

A high point in the resource development efforts is the exploration of deep-sea mineral deposits in the Indian Ocean—a programme under which polymetallic nodules have been collected from a depth of 3.6 km. The nodules contained nickel, copper and cobalt besides manganese and iron. With this achievement of CSIR the country has joined the select group of six countries (USA, UK, USSR, Japan, West Germany and France) who possess the capability of collecting polymetallic nodules from deep-sea floor.

Prof. J.K. Ghosh, Indian Statistical Institute, Calcutta, has been chosen for the 1981 Shanti Swarup Bhatnagar Prize in mathematical sciences [CN, 31 (1981), 177].

Based on the know-how developed by CSIR, Unichem Laboratories Ltd, Bombay, started the production of N- β -phenylethylanthranilic acid (proprietary name, Tromaril), a potent non-steroidal anti-inflammatory and anti-rheumatic drug. Sales in four months are reported to have touched about Rs 10 million. Another important process know-how developed by the Council and taken up by the same firm relates to the cervical dilator Isapent I; it was being marketed under the trade name Dilex-C. The device, made from the indigenously available *isapgol* (*Plantago ovata*) seed husk, is better and cheaper than the imported 'laminaria tent' presently used in medical termination of pregnancy.

A 400 tonnes/annum plant for the production of endosulfan commissioned by Bharat Pulverising Mills Pvt. Ltd would be producing the broad spectrum insecticide valued at Rs 40 million annually. Other products whose manufacture was started or was likely to be started on the basis of CSIR's know-how include: glyoxal, tallow-like fat from castor oil, 6-aminopenicillanic acid, methylchlorosilanes, quinapryamine sulphate and chloride, Chlorofenvinphos, tartaric acid, β -naphthol, primaquine, bumetanide, sulphamethoxazole, and gibberellic acid.

A turn-key job for the production of diosgenin for the Tamil Nadu government was completed. The agro-technology developed for mass production of the German chamomile (*Matricaria chamomilla*) flowers to yield blue oil was exploited commercially. Good-quality paper, board and greaseproof paper have been produced from water hyacinth, an aquatic weed which poses environmental pollution problems.

Aluminium alloy-bearing bushes (PM401) were developed as substitute for bronze-bearing bushes and supplied to the Research, Design and Standards Organization, Lucknow, for evaluation.

Under three collaborative programmes of work with Visvesvaraya

Iron & Steel Ltd on process standardization for the production of high-strength low-alloy steels, industrial-scale heats of niobium and niobium-vanadium steel were made in a 12-tonne LD converter. These steels are used in the construction of ships, bridges, buildings, pressure vessels, pipelines, wagons, etc.

In a collaborative project with Kalinga Iron Works on the production of heat-hardened agglomerates, iron ore fluxed sinters were produced continuously in a pilot plant. By charging these sinters along with lumpy ores into low-shaft furnace the coke rate could be decreased and the production of pig iron increased considerably.

A pilot plant for the development of a solvent deoiling process was commissioned with the assistance of Engineers India Ltd. Performance runs were in progress to develop process and engineering know-how for wax deoiling.

A 100 kg/hr continuous oil agglomeration pilot unit was set up and commissioned. A reduction of 30% in oil consumption was achieved by using additives.

Based on the know-how supplied by CSIR, National Newsprint and Paper Mills, Nepanagar, commissioned an integrated wastewater treatment plant.

A solar hot water demonstration unit was designed and installed at the Jehangir Textile Mills, Ahmedabad; the unit could supply 6000 litres of hot water at 80°C.

An economical water-softening unit based on the continuous countercurrent ion-exchange technique was designed and developed. It gives a continuous supply of soft water and the process is more economical than the lime-soda process and the conventional fixed-bed ion-exchange process.

Technical assistance was provided for the design and construction of a slow sand filtration plant at Pothunuru village in Andhra Pradesh. The plant provides treated water to 4500 residents of the village. The other states where such plants were in operation are

Haryana, Maharashtra and Tamil Nadu.

A tractor-drawn combine harvester was designed and developed on sponsorship basis. Also developed were an automatic reaming machine for reaming of bores of valve guides in vertical position and a versatile single-spindle automatic turret lathe with provision for six or eight station turret.

A fibreglass epoxy resin impregnating tape manufacturing machine GRIM was developed for the Hindustan Aeronautics Ltd, Bangalore. A brake pad material friction test rig was also developed for HAL. An electronic weighing system (240-tonne) was designed and fabricated for the wagon tripper built by the Heavy Engineering Corporation Ltd. The system was installed at the Coal Handling Facility, of which the tripper is a part, of the Bongaigaon Thermal Power Station in Assam.

Some of the important instruments developed during the year are: minicar-dioscope, cordiotocograph, and temperature indicator for type K thermocouple. Indigenous technology was developed for the fabrication of Fresnel lens master which finds use in harnessing solar energy. Two masters conforming to the requirements of overhead projectors and solar concentrators were successfully fabricated.

Of the 1293 processes developed by the constituent laboratories of the Council up to the year 1980-81, 570 processes were reported to be in production. Thirty-four new processes went into production and 61 processes were released to industry for the first time during 1980-81. As many as 633 sponsored research projects were undertaken at a cost of Rs 98.64 million to the sponsoring agencies. Of these, 231 projects were completed. The CSIR laboratories had 347 consultancy assignments valued at more than Rs 9.70 million; 158 assignments were completed. Premia/royalties received through the National Research Development Corporation of India

amounted to Rs 6.103 million. The financial inputs in respect of CSIR for 1980-81 were Rs 611.246 million.

During the year, 117 patent applications were filed, 37 patents were accepted, and 24 patents sealed in India. One patent was filed and two were sealed abroad.

Pilot plants for the production of potassium shoenite, sodium alginate, citrus juice concentrate, Miltone and terpineol were set up in Burma for the Central Research Organisation, Rangoon. □

PERSONNEL NEWS

Appointments/Promotions

At the National Chemical Laboratory (NCL), Pune, Dr P.A. Ramachandran, Scientist C, has been promoted as Scientist EI (9 Dec. 1981), and Dr J.S. Yadav has been appointed Scientist C (1 Dec. 1981).

Promoted consequent on assessment at NCL (with effect from dates given in parenthesis) are:

As Scientist EII

Dr L.M. Pant and Dr (Kum.) S.B. Kulkarni (both from 9 Dec. 1981)

As Scientist EI

Shri D. Sen Gupta (1 June 1979); Dr C.I. Jose (1 Sep. 1979); Dr S. Gundiah and Dr T. Ravindranathan (1 Nov. 1979); Shri V. Krishnan (26 Nov. 1979); Dr M.P. Reddy (1 March 1980); Dr D. Raghunath (1 April 1980); Dr B.B. Ghatge (1 May 1980); Dr P.H. Brahme (1 June 1980); Dr D.D. Nanavati (1 July 1980); Dr M.N.S. Murthy (26 Oct. 1980); and Dr S.S. Katti (1 Feb. 1981)

As Scientist C

Dr O.G.B. Nambiar (3 Oct. 1979); Dr (Kum.) Z. Muljiani (21 Oct. 1979); Dr S.V. Paranjpe, Shri J.C. Sehra, Dr E.D. Pandhare, Dr P.P. Pai, Dr P. Umamathy, Shri S.K. Pandit and Shri M.S. Setty (6 March 1980); Shri S. Soundararajan (7 March 1980); Shri M.G. Sane (14 March 1980); Dr N.N. Dhaneshwar (10 April 1980); Shri D.C. Mehta, Dr P.N. Khanna and Shri D.R.

Apte (27 May 1980); Dr B.V. Bapat (17 July 1980); Dr V.K. Hinge (22 July 1980); Shri C.U. Saraf (25 Sep. 1980); Dr A.G. Lugade (1 Dec. 1980); Shri M.B. Unde (8 Dec. 1980); and Shri N.R. Shukla (1 May 1981)

As Scientist B

Dr (Smt) M. Rao (18 Sep. 1979); Dr V.M. Sathe (18 Oct. 1979); Dr K.R. Bhinge (1 Nov. 1979); Shri S.L. Phatak (4 Nov. 1979); Shri V.R. Patwardhan (1 Dec. 1979); Dr Gopal Pathak (16 Feb. 1980); Dr B.S. Rao (10 March 1980); Shri R.R. Hendre (3 April 1980); Shri K.R. Srinivasan (23 April 1980); Shri P.P. Lohokare (19 June 1980); Shri V.R. Joshi (31 Aug. 1980); Dr A.R. Mehendale (23 Sep. 1980); Shri S.R. Harisangam, Dr P.P. Moghe, Shri R.S. Karnik, Shri K.C. Brahme, Shri C.J. Johnny, Dr C.S. Dorai, Dr A.S. Vaidya, Dr V.B. Patil, Dr (Smt) H.V. Kamath, Shri K.G. Deshpande, Shri R.B. Malvankar, Shri H.S. Jagtap, Dr S.T. Kshirsagar, Shri I. Balakrishnan, Dr S.D. Sathaye and Shri C.E. Deshpande (24 Feb. 1981); Dr M.P. Kulkarni (24 March 1981); Shri R.A. Modak (11 May 1981); Shri S.S. Ramdasi (25 May 1981); and Dr S.K. Kamath (9 June 1981)

As Documentation Officer B

Shri M.B. Patil (28 Feb. 1980)

As Technical Officer B

Shri S.T. Dhume (20 Sep. 1979)

As Scientist A

Shri A.B. Landge (10 Oct. 1979); Shri V.R. Kulkarni and Smt J.J. Shrotri (18 Oct. 1979); Dr (Kum.) N.R. Pavaskar (18 Nov. 1979); Shri N. Amarnath (18 Jan. 1980); Shri C.V. Kavedia (16 Feb. 1980); Dr S.D. Pradhan (18 Feb. 1980); Dr B.R.K. Murthy (25 Feb. 1980); Shri S.G. Pataskar (26 Feb. 1980); Shri S.G. Hegde (4 March 1980); Shri Nand Kishore (2 April 1980); Shri G. Samuel (3 April 1980); Shri K.F. Lunkad (9 June 1980); Smt V.V. Ghaisas (19 June 1980); Shri A.S. Shaikh (31 Aug. 1980); Dr (Smt) M. Rele (15 Oct. 1980); Dr B.M. Shinde (2 Dec. 1980); Smt K.K. Deshmukh (1 Jan. 1981); Shri S.D.

Sansare (9 Jan. 1981); Shri H.S. Soni (16 Feb. 1981); Shri M.N. Kamthe (1 March 1981); Shri R.A. Kulkarni (13 April 1981); Shri M.B. Sabne (9 June 1981); and Shri G.M. Chaphekar (18 June 1981)

As Documentation Officer A

Shri M.D. Panse (6 Sep. 1978) and Smt M.S. Naigaonkar (1 Nov. 1979) □

Shri Y.S. Murty

The promotion of Shri Y.S. Murty of the National Environmental Engineering Research Institute (NEERI), Nagpur, as Scientist EII, has been announced [CN, 31 (1981), 167].

Shri Murty (born 29 Feb. 1932) obtained his master's degree in public health engineering from the College of Engineering, Guindy, Madras, in 1957 and M.S. in civil engineering from Wisconsin University, USA, in 1972.

With NEERI since 1960, Shri Murty has specialized in environmental engineering. He was deputed during 1971-72 to Wisconsin University under a WHO scholarship and participated in the 1975 Global Workshop on 'Appropriate Water and Waste Treatment Technology in Developing Countries', The Hague. He was a WHO short-term consultant at Baghdad on pollution control. He also reorganized the sanitary engineering laboratory in the Directorate of Sanitary Engineering, Jakarta, Indonesia, on another WHO assignment.

Head of NEERI's Hyderabad zonal laboratory for the last few years, Shri Murty has contributed towards solving environmental engineering problems in Andhra Pradesh. He has been actively involved in integrated rural development under the Karimnagar Project. He is a member of the Institution of Engineers (India) and Indian Association for Water Pollution Control. Has some 20 publications to his credit.

Dr H.C. Arora

The promotion of Dr H.C. Arora of the National Environmental Engineering

Research Institute (NEERI), Nagpur, as Scientist EI has been announced [CN, 31(1981), 167].

Dr Arora (born 26 Aug. 1935) obtained first class master's degree in zoology (Hons School) from the Punjab University in 1958. With NEERI since 1959, Dr Arora has specialized in water and wastewater pollution control, treatment and disposal. In April 1975, he was deputed to UK under a WHO fellowship for training in surface water pollution and its control. Heading the NEERI's Kanpur zonal laboratory for the last 14 years, he has helped solve environmental problems in Uttar Pradesh. Has about 76 publications/technical reports to his credit. □

Honours & Awards

Amar Dye Chem Award to Dr V.S. Patwardhan of NCL
Dr V.S. Patwardhan of the National Chemical Laboratory (NCL), Pune, has been awarded the Amar Dye Chem Award for excellence in research and development in chemical engineering for the year 1981. This award is given annually to a chemical engineer of less than 35 years of age by the Indian Institute of Chemical Engineers.



Working in the NCL's Chemical Engineering Division since 1974, Dr Patwardhan has contributed extensively to several areas of chemical engineering: interaction of hydrodynamics and chemical kinetics in gas-liquid contractors, hydrodynamics of liquid flow in packed columns, optimization of fixed and fluid bed reactors, interpretation of immobilized enzyme kinetic data, and steady-state multiplicity

in biochemical reactors. He was the project leader in the hexachlorocyclopentadiene project which involved the development of a three-step manufacturing process, the development of a fluidized-bed reactor with specially designed bubble caps, and the setting up and running of an integrated pilot plant involving several recycle streams. As project leader, he was involved in the development of a suitable catalyst for the manufacture of benzaldehyde from toluene by air oxidation, and in the pilot plant work.

Sunder Lal Hora Medal to Dr C.R. Krishna Murti

In recognition of his outstanding contribution to the development of life sciences in India, Dr C.R. Krishna Murti, Director, Industrial Toxicology Research Centre, Lucknow, has been awarded Dr Sunder Lal Hora Memorial



Medal in Life Sciences for the year 1981. Prof. M.G.K. Menon, President, Indian National Science Academy (INSA), and Secretary, Department of Science and Technology, presented the medal, instituted by INSA.

Dr Krishna Murti delivered a lecture on 'Bilirubin—a Model for Biotransformation of Toxic Compounds' in the UN University, CFTRI campus, Mysore, on 1 January 1982 at INSA's anniversary general meeting. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH Advertisement No. 45/81

It is proposed to appoint two Scientists F in the Regional Research Laboratory (RRL), Hyderabad. This is a multidisciplinary chemical industry-oriented R&D institution working in the following main areas: oils and fats, surface coatings, coal, inorganic and organic chemistry

pesticides, drugs, chemical process development and design, mechanical development and design engineering, and optimization and simulation. The laboratory has excellent facilities for analytical instrumentation, a workshop and a pilot plant, a computer, and a library. Fundamental research is also encouraged.

Post No. 1 (Oils & Fats)

Job Requirements

The selected candidate should provide high-level leadership to identify, plan, organize, coordinate and successfully execute R&D programmes in the area of oils and fats. The projects expected to receive thrust include development of value-added products and improved processes based on oilseeds, oils and related agro-materials as well as basic studies on occurrence, distribution and utilization of oils and fats and other lipids in plants. He will be responsible for leading a sizeable group of R&D scientists at senior level.

Qualifications & Experience

(i) High academic qualifications at doctorate level in oil technology, organic chemistry or chemical engineering. (ii) About ten years' experience in the field including experience in guiding R&D programmes, record of publications, doctoral theses, patents, and processes.

Post No. 2 (Design & Engineering Group—Mechanical Engineering)

Job Requirements

The selected candidate should be able to plan, organize, guide and lead the group engaged in detailed engineering of projects, undertaken by the laboratory and also in the design and development of new or more efficient chemical process equipment, and to provide leadership to the groups engaged in the commissioning of plants based on laboratory's designs. The position involves interdisciplinary activity and the candidate is expected to have experience, aptitude and the right temperament for such cooperative endeavour.

Qualifications & Experience

A good degree in mechanical engineering with at least 15 years' professional experience and proven qualities of leadership and ability in the design of chemical plant and equipment. Experience in installation and operation of major chemical plants is very desirable.

Scale

Rs 2000-125/2-2500 plus allowances at Central Government rates. A higher start can also be given. This is a contractual appointment for six years. The contract is renewable and the incumbent can also be confirmed in the post. Age: preferably below 50 years, relaxable in deserving cases.

Those interested may send their *curriculum vitae* on or before 12 February 1982 to the Chief (Administration), Council of Scientific and Industrial Research, Rafi Marg, New Delhi 110001. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

VOL 32 NO 3 15 FEBRUARY 1982

Padma Bhushan to Dr A.R. Verma

Dr Ajit Ram Verma, Director, National Physical Laboratory, New Delhi, is among the recipients of Presidential



Awards for 1982. Dr Verma wins Padma Bhushan for his contributions to science and technology. □

R-Day invention awards for two CSIR processes

Of the 18 inventors who share the Republic Day Awards worth Rs 1.32 lakh for nine meritorious inventions announced by the National Research Development Corporation of India, five are CSIR scientists who between them share Rs 37,000 for two inventions.

Shri G.G. Sarkar, Shri B.B. Konar and Shri Sukdob Sakha of the Central Fuel Research Institute, Dhanbad, have been jointly awarded Rs 25,000 for developing an improved 'process for demineralization of coal by oil agglomeration'.

The process is for the beneficiation of high-ash coal and hard-washable coking coal, non-coking coal and also the middlings obtained from washeries to reduce their ash content so that they can be utilized more efficiently in metallurgical industries. The process also

improves the performance of coke ovens and characteristics of coke obtained from high-temperature carbonization.

Shri Hardy Singh and Shri R.S. Kundi of the Mechanical Engineering Research and Development Organisation, Ludhiana, jointly get Rs 12,000 for developing a simple automatic hand-knitting machine for obtaining different patterns in knitting. □

Structure and sequence organization of DNA in eukaryotes

The effect of nuclear DNA content on the proportion and the properties of repeated DNA sequences and on the mode of DNA sequence organization has been studied by Smt. Vidya S. Gupta, a research fellow, who worked in the Biochemistry Division of the National Chemical Laboratory (NCL), Pune. The plant species studied were finger millet, pearl millet, and rice. Used as staple food, these are cultivated very commonly as field crops throughout India.

The study has shown that nuclear DNA content influences the interphase nuclear structure and the genome organization in plants. Plant species with low DNA content (<4 pg) have short chromosomes, chromocentric nuclei, low repetitive DNA content, and diverse arrangements of repetitive and single-copy DNA sequences. The three Gramineae plant species have low DNA content and exhibit all these characteristics.

Rice DNA showed lack of interspersion of repeated and single-copy DNA sequences. Rice is the first plant genome in eukaryotes which shows a very novel type of DNA sequence

organization pattern. Gene regulation models have been proposed in which it is assumed that repeated sequences are interspersed. With the present data on rice genome, it will be possible to propose new models of gene regulation in plants.

Smt. Gupta, who carried out this work under the guidance of Dr P.K. Ranjekar of NCL, was awarded Ph.D. degree by the University of Poona for her thesis based on the study. □

Binder Economy and Alternative Binders in Road & Building Construction

CRR I SYMPOSIUM

The problem of acute shortage of cement and bitumen, the two most commonly used binders in road and building construction, was discussed at a symposium organized by the Central Road Research Institute (CRR I), New Delhi, on 3-4 November 1981. The symposium explored the ways and means to bring about economy in the use of these binders, development and use of alternative binder materials, and adoption of appropriate construction techniques. As many as 59 papers, including some by foreign experts, were presented at the symposium, which was attended by 140 delegates.

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Dr J N Baruah appointed Director
of RRL-Jorhat

2

The symposium recommended that the economy in consumption of cement could be effected by improved cement packaging, stipulation of proper concrete mix design, exercise of quality control, greater use of appropriate machinery, adoption of latest technologies like ready-mixed concrete and fibre-reinforced concrete, timely maintenance of structures, use of alternative hydraulic binders like fly ash, pozzolanas and rice husk ash, and utilization of polymer-based compositions in concrete.

For effecting economy in the consumption of bitumen the symposium recommended the development of appropriate road surfacing specifications, use of techniques of rejuvenation and reconditioning of existing surfacings, timely maintenance of surfacings, adoption of bulk supply system for bitumen, revival of road tar industry, site production and use of bituminous emulsions, utilization of additives like rubber and anti-oxidants and the development of binders from wood waste, lignin waste, etc.

Prof. S. Nurul Hasan, CSIR's Vice President, who inaugurated the symposium, suggested that steps should be taken to establish an inter-disciplinary mechanism at high government level to ensure more effective coordination for optimal exploitation of the results of research in the field of binder economy and alternative binders. □

Research and Leather Industry: Get-together at Jullundur

The Central Leather Research Institute's Jullundur regional extension centre organized a research and industry get-together on 5 December 1981 at Jullundur. More than 100 delegates representing the National Research Development Corporation of India, Government Tanning Institute (Jullundur), Punjab State Leather Development Corporation, Khadi & Village Industries Board and leading tanneries of the region participated in the get-together which discussed the

problems faced by the leather and leather-based industries.

The sports goods sector, it was pointed out, offered large scope for foreign exchange earning, provided better-quality leather material was made available to the industry. A leading tanner of the region called for the preservation of the art and technique of bag and *nari* leather tanners. Problems associated with waterproof sole leather manufacture were also mentioned. Small entrepreneurs and organized tanners had problems with effluent disposal, and, in this context, the setting up of a leather industrial estate was suggested.

PION-PION SCATTERING AND HIGH-ENERGY THEOREMS

Bhatnagar Prizewinner Prof. Roy's work

'Strong interactions', responsible for nuclear force, obey a few generally accepted principles. Among these are the non-linear unitarity condition (based on the quantum mechanical superposition principle and conservation of probability) and analyticity and crossing symmetry properties (derived via the causality principle from axiomatic field theory). The fundamental researches of H. Lehmann, M. Froissart and André Martin revealed during the sixties that these general principles alone imply powerful restrictions on the theoretically simplest strong interaction process of pion-pion scattering on the one hand, and high-energy theorems for experimentally accessible processes such as meson-nucleon scattering on the other.

An exact integral equation for pion-pion scattering involving only physical region partial waves and valid up to $s = 60 m_\pi^2$ (\sqrt{s} = centre of mass energy and m_π = pion mass) was derived from axiomatic field theory by S.M. Roy

Prof. S.M. Roy of the Theoretical Physics Division of the Tata Institute of Fundamental Research, Bombay, has been chosen for the 1981 Shanti Swarup Bhatnagar Prize in physical sciences [CN, 31 (1981), 177].

Former students of the Government Tanning Institute, Jullundur, desired that training facilities should be provided at CLRI as part of their training course. The representatives from government agencies spoke of the assistance rendered by them by way of financing, marketing, etc. to the small sector of the industry.

Dr G.S. Sidhu, Director General, Scientific and Industrial Research, underlined the need for the industry to realize the value of the investment made in research, which, he said, should be judged not only by way of direct results but also through various other hidden benefits. □

[*Phys. Lett.*, 36B (1971), 353]. This equation, now known as Roy's equation, has proved to be valuable in the analysis of pion-pion data. Based on



this, Basdevant, Frogatt and Petersen at CERN, Pennington and Protopopescu at Berkeley and other groups have determined pion-pion phase shifts and scattering lengths. However, the P-wave scattering length so deduced $[(0.040 \pm 0.004) m_\pi^{-3}]$ is in strong disagreement with the CERN-Munich experimental result (≈ 0.1) reported by D. Morgan at the 17th International Conference on High Energy Physics, London. The resolution of this problem awaits new high statistics measurements.

An interesting rigorous consequence of this equation is an absolute lower bound on the $\pi^0 \pi^0 \rightarrow \pi^0 \pi^0$ scattering length (a_0) derived by C. Lopez and G.

Mennessier [*Phys. Lett.*, 58B (1975), 437]:

$$a_0^{\pi\pi^+\rightarrow\pi^+\pi^-} \geq -1.8 \hbar/(m_\pi c).$$

A generalization of the equation incorporating three-channel crossing symmetry was established and used to obtain physical region partial wave equations valid up to $s = 125.31 m_\pi^2$ [G. Mahoux, S.M. Roy, and G. Wanders, *Nucl. Phys.*, B70 (1974), 297]. Through this equation, the axiomatic analyticity domain of pion-pion partial waves was extended to include a region going from $\text{Re } s = -28$ to $125.31 m_\pi^2$ and $|\text{Im } s|$ up to $64.5 m_\pi^2$, and in this domain explicit analytic continuations in terms of physical region absorptive parts were obtained [S.M. Roy and G. Wanders, *Phys. Lett.*, 74B (1978), 347; and *Nucl. Phys.*, B141 (1978), 220].

These equations are the basis of extensive work by Atkinson, Warnock, Wanders and others towards construction of pion-pion amplitudes obeying axiomatic field theory constraints.

In the area of high-energy theorems, Roy has worked mainly on consequences of unitarity for positivity properties of absorptive differential cross-sections, width of the elastic diffraction peak, bounds on elastic differential cross-sections and bounds on particle-antiparticle total cross-section differences. Among these results, the bound on $|\sigma_{\text{tot}}^{\pi^-p} - \sigma_{\text{tot}}^{\pi^+p}|$ in terms of the integrated pion-nucleon charge exchange cross-section derived in collaboration with Virendra Singh is especially interesting. The bound has been experimentally tested at the Serpukhov and Fermilab accelerators. Important theoretical speculations arise from the apparent violation of this rigorous bound.

Born on 2 September 1941 in District Mymensingh, Bangla Desh, Roy obtained his B.Sc. (Hons) and M.Sc. degrees in physics from the Delhi University in 1960 and 1962 respectively. Awarded a Government of India's scholarship, he earned his M.A. and Ph.D. degrees in physics at the

Princeton University, USA, in 1964 and 1966 respectively, under the guidance of Prof. Richard Blankenbecler. After a postdoctoral tenure (1966-67) at the University of California, San Diego, USA, he joined TIFR in 1967. Dr Roy has had assignments as visiting scientist at CERN, Geneva (1970-71; 1976), CENS (Saclay Nuclear Research

Centre), France (1971-72), and the State University of New York at Stony Brook, USA (1975). He has collaborated mainly with Virendra Singh at TIFR, André Martin at CERN, Gilbert Mahoux at Saclay and Gerard Wanders at the University of Lausanne, Switzerland. Since 1977, he is Associate Professor at TIFR. □

MAGNETIC RESONANCE AND APPLICATIONS

Bhatnagar Prizewinner Prof. Srinivasan's work

Prof. Srinivasan has specialized in the field of magnetic resonance and applications of this technique to the study of the solid state, especially the motion of molecular groups and phase transitions. He has, over the last 18 years, established a very active group in this field, which has laid accent on the development and construction of all instrumentation required in the laboratory.



Using equipment built in the laboratory, his group has obtained several new insights. The roles of water molecules, protons, and ammonium groups have been studied in several crystals. The nature of the mechanism of phase transition in several crystals has been studied by using nuclear magnetic resonance (NMR). Electron spin resonance (ESR) has been used to demonstrate the flipping of protons between two allowed sites in ferroelectric crystals belonging to the family of potassium dihydrogen phos-

phate. ESR has also been used to demonstrate ferroelastic switching.

NMR studies of ammonium groups have shown the presence of quantum mechanical tunnelling motion of the groups. The consequences of this motion for magnetic resonance have been worked out.

Much of the work requires studies at low temperatures, but recently Prof. Srinivasan and his coworkers have designed and built equipment for magnetic resonance studies at very high pressures (up to 18,000 atm). The extension of these studies to such high pressures has already led to some very novel observations on molecular motions and phase transitions in solids. This facility for magnetic resonance at high pressures is at present not available anywhere else in India, and is in fact available only in a few laboratories in the world.

Prof. Srinivasan (born 21 April 1938) studied at St Xavier's High School, Patna, and then Patna University, where he obtained his B.Sc. (Hons) in 1957 and M.Sc. in physics in 1959. After a brief spell as a teacher in that university, he won an ICI (India) scholarship to work in UK. Here he earned his Ph.D. from the Birmingham University in 1963. On his return, he joined the Physics Department of the Indian Institute of Science, Bangalore, as a postdoctoral fellow, and has been a professor there since 1971. He has held visiting appointments during the last 15 years in several universities in Canada, Yugoslavia, and The Netherlands

Prof. R. Srinivasan, Chairman, Department of Physics, Indian Institute of Science, Bangalore, has been chosen for the 1981 Shanti Swarup Bhatnagar Prize (along with Dr S.M. Roy of the Tata Institute of Fundamental Research, Bombay) in physical sciences [*CN*, 31(1981), 177]

A fellow of the Indian Academy of Sciences and a member of the editorial board of *Indian Journal of Pure and Applied Physics*, he has to his credit 110 research papers. □

ERRATUM

Instead of Dr P.V. Sane's photograph that should have appeared in the article 'Chloroplast Membrane Structure and Function: Bhatnagar Prizewinner Dr Sane's work' vide *CN*, 32 (1982), 11, that of Dr S.M. Roy (1981 Bhatnagar Prizewinner in physical sciences) of Tata Institute of Fundamental Research has been printed inadvertently. The photograph of Dr Sane is given below:



We regret the error.

PROGRESS REPORTS

CRRI Annual Report: 1980-81

The Central Road Research Institute (CRRI), New Delhi, has brought out its annual report for 1980-81, which shows that the institute continued to pursue the research projects as envisaged in its approved research programme falling broadly into the following sub-disciplines: soils, flexible pavements, rigid pavements, roads, bridges, electronic instrumentation, and traffic engineering. Emphasis was laid on the development of rural roads and attempts were being made to develop suitable and economical specifications for these roads through performance evaluation of the test tracks constructed for the purpose and of the already existing stretches. Surveys of materials for roads, development of specifications and appropriate technologies for rural roads, and use of polymeric compounds as stabilizers for soil/gravel and study of intrinsic properties of soils formed the activities of the extension sub-discipline. Several important consultancy assignments were handled during the year;

these included: measures for improvement of the Bombay Municipal Corporation roads, corrosion prevention of the bridge across the Little Rann of Kutch and cost-benefit analysis of the proposed bridge over River Jamuna at Delhi. Another assignment of far-reaching importance was the survey of the north-eastern region to select suitable locations for producing burnt clay pozzolanas and lime-burnt clay pozzolana mixture. Assistance was rendered to the Tanzanian government in preparing a project report for the setting up of their Transport and Road Research Institute. In the field of highway engineering, an important project undertaken by CRRI related to installation of horizontal drains on a field scale backed up with instrumentation for sub-surface drainage at the Kateri junction on the Coonoor-Ooty Highway.

A systems approach was adopted for planning the rural road network. Relevant data from selected blocks of villages with different patterns of habitation were collected and analyzed through operations research techniques. The model would be useful in the preparation of master plans at district level for rural road development.

Inadequate drainage conditions cause considerable damage to rural roads. Employing locally available soil stabilized with cement and manual construction aids, the institute constructed drains for these roads and was studying their performance.

A detailed report on the stabilization of solar salt pan beds in Sultanpur village, Haryana, was furnished to the Department of Industries of the state. Based on the laboratory tests on soils and aggregates collected from a 50 km² saline area of Sultanpur the report proposes different specifications for field trials for stabilization of reservoir, condenser and crystallizer beds.

At the instance of the Public Works Department of the Delhi Administration, the institute studied the suitability of soils, including the

compaction characteristics of soils from borrow areas and field compaction tests, for construction of the 8 km long embankment for the National Highway By-pass connecting the GT Road and the Wazirabad barrage. CRRI trained the PWD's staff besides submitting the necessary reports.

The deficiency in compaction of the bituminous mix around manholes on urban roads results in ingress of water during rainy season, leading to ravelling of the surfacing. This affects the riding quality of these roads. For such locations a mastic asphalt mix was designed.

A patching mix was developed that could be stored and could be applied at ordinary temperatures. Compaction could be done with a hand-tamper, a one-tonne small roller or with a plate vibrator, and the road could then be opened to traffic.

The institute investigated the causes of distress of the Ring Road in Delhi and recommended an overlay of 5 cm thick bituminous macadam base course with 5 cm thick rolled asphalt wearing course using 30/40 grade bitumen. The signallized intersections were to be surfaced with two layers of bituminous macadam mix with seal coat. CRRI also investigated the widening and improvement of Najafgarh Road, New Delhi, and Batote-Kishtwar Road in Jammu & Kashmir.

Theoretical studies were being carried out for the design of rigid pavements for tracked vehicles and for designing composite pavements with semi-rigid bases or sub-bases. The projects being pursued in concrete road technology relate to continuous reinforced concrete pavements with elastic joints, fibre-reinforced concrete pavements, and vacuum concrete.

Analysis of the data obtained from the overlay test track laid on Delhi-Aligarh section of GT Road was carried out to study the progression of cracking. Nearly 50 flexible overlay specifications have been tried on this track which was

laid over a distressed thin cement concrete old pavement.

A project on distribution of braking force on bridge bearings was completed and another on improving the metallic bearings for use in place of elastomeric bearings for higher loads was initiated.

Nondestructive methods were developed for measuring *in-situ* density of highway engineering materials, for pavement evaluation, and for measuring the strength of cement concrete mixes.

An electrical settlement/heave meter was developed for the subsoil stratum underneath embankments and other earthworks. With this device the settlement or heave can be measured at a number of points at different depths without causing any hindrance to construction activity.

Projects on traffic and transportation flow characteristics of urban roads of Delhi were continued. The project relating to the evaluation of the performance of the reserved bus lane system was completed. CRRRI also prepared a plan for the traffic circulation in front of the new terminal building of the Bombay international airport. □

DEPUTATION BRIEFS

Dr V.V.N. Kishore of the Central Salt & Marine Chemicals Research Institute, Bhavnagar, was deputed to Switzerland from 2 July to 1 October 1981, under the Indo-Swiss collaborative project on the development of a solar water pump. Dr Kishore received training on solar energy utilization and solar pump modules at the Swiss Federal Institute of Technology, Lausanne, and Swiss Federal Institute for Reactor Research, Wurenlingen. He also made a comparative study of different solar water pumping systems, and an experimental investigation on a low-pressure steam engine developed by the Lausanne institute.

Dr C.K. Atal, Director, Regional Research Laboratory, Jammu, visited

Greece, Bulgaria and USA during September-October 1981 on deputation.

While in Greece, Dr Atal attended the International Symposium on Aromatic Plants held at Thessaloniki and delivered a lecture on 'Development of new essential crops in India'.

He attended the International Conference on Chemistry and Biotechnology of Biologically Active Natural Products at Sofia and chaired one of the sessions. On behalf of CSIR he also held a formal meeting with Bulgarian officials and discussed some of the details of the protocol for scientific and technological cooperation during 1981-83.

As a WHO expert consultant, for about four weeks, to the Division of Chemistry and Physics and Division of Toxicology, Bureau of Foods, Food and Drug Administration, USA, Dr Atal investigated the cases of human poisoning due to contamination of food with pyrrolizidine-containing seeds.

* * *

Dr Asad Ali Khan of the Regional Research Laboratory (RRL), Hyderabad, was deputed to Japan from 28 November to 7 December 1981 for visiting industrial establishments to get acquaintance with the industrial applications of electrodialysis. The Hyderabad laboratory had developed a process for the manufacture of glyoxal that made use of a packed bed of granular ion-exchange resins for purification of crude glyoxal solution – a process that is being commercially exploited by two Indian firms. As the manufacturers of glyoxal in Japan were reported to be using the electrodialysis technique for deacidification of crude glyoxal solutions, Dr Khan visited two of the leading manufacturers/users of electrodialyzers to explore the possibilities of using the electrodialysis process, particularly for the removal of nitric acid in the process of manufacture of glyoxal in the existing as well as future plants based on the RRL-Hyderabad process.

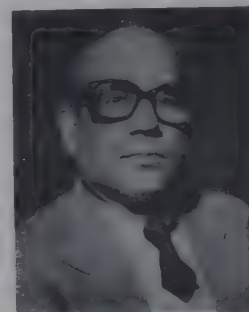
* * *

Dr V.P. Pandya of the Central Salt & Marine Chemicals Research Institute, Bhavnagar, was deputed to FRG from 2 October to 15 November 1981 under the CSIR-DAAD Exchange of Scientists programme. Visiting several German institutions where work on silicates and zeolites is being pursued, Dr Pandya acquainted himself with the methods for evaluation of zeolites and silicates for determining their industrial utility, design and fabrication of high-pressure/temperature resisting cell for studying homogeneous/heterogeneous catalysis, use of commercial detergents in the preparation of thermal insulation, and techniques for upgrading bentonite clays. □

PERSONNEL NEWS

Dr J.N. Baruah appointed Director, RRL-Jorhat

Dr J.N. Baruah of the Regional Research Laboratory (RRL), Jorhat, who was heading this laboratory as Acting Director, has been appointed Director with effect from 6 January 1982.



For an account of Dr Baruah's scientific achievements, see CN, 31 (1981), 62. □

Shri T.S. Rajagopalan

Shri T.S. Rajagopalan, who was on an Unesco assignment in Mogadishu, Somalia, resumed as Scientist in charge, Indian National Scientific Documentation Centre, New Delhi, on 4 December 1981, relieving Shri A. Krishnan, who was looking after the duties till then. □

Appointments/Promotions

At the Indian National Scientific Documentation Centre (Insdoc), New Delhi, the following have been promoted on assessment (with effect from dates given in parenthesis):

As Documentation Officer EII

Shri A. Krishnan (10 Dec. 1981)

As Documentation Officer EI

Shri G.R. Parkhi (1 Aug. 1980) and Shri P.N. Neogi (1 Oct. 1980)

As Translation Officer EI

Shri A.R. Chakraborty (1 Dec. 1978)

As Documentation Officer C (Computer)

Shri A.M. Arora (5 April 1979)

As Translation Officer C

Shri C.R. Balasubramanian (11 July 1979)

As Printing Officer C

Shri M.K. Berman (20 June 1980) and Shri R.L. Sharma (3 Aug. 1980; retired subsequently)

As Photography Officer C

Shri M.L. Mehta (20 June 1980)

As Documentation Officer B

Shri R.N. Neogi; Shri S.K. Chadha; Shri Virender Kalra; Shri K.L. Gogia; Kum. Urmil Goyal; Smt. T.A. Pandalai; Shri Y.K. Sharma; Shri B.R. Keshava Rao; Shri K.M. Peter; Shri H.S.D. Khatri and Smt Susy Peter (all from 20 June 1980)

As Art Officer B

Shri M.K. Dass Gupta (24 Jan. 1979)

As Documentation Officer A

Smt Ramesh Arora; Shri S.K. Saxena; Smt. Rajalakshmi; Smt. Aruna Karanjai; Smt. Sudershan Behl; and Shri R.L. Anand (all from 20 June 1980)

As Printing Officer A

Shri Jagdish Ram (1 Aug. 1980)

Appointed, on promotion, as Technical Officers B at Insdoc are: Shri K. Mohan Dass (5 Jan. 1982) and Shri Rajan Prasad. □

Shri D. Raguraman

The promotion of Shri D. Raguraman of the National Environmental Engineering Research Institute (NEERI), Nagpur, as Scientist EI has been announced [CN, 31(1981), 167].

Shri Raguraman (born 24 April 1938) obtained his master's degree in public health engineering in 1961. With NEERI since 20 January 1964, Shri Raguraman has specialized in industrial wastewater treatment and control. He was deputed to UK in 1970 under CSIR-British Council Exchange Programme. In charge of the consultancy wing of NEERI for a number of years, he has been heading the NEERI's Bombay zonal laboratory for the last three years. He has contributed in considerable measure towards the solution of environmental problems in the Bombay region. Has 70 publications/technical reports to his credit. □

Dr K.L. Saxena

The promotion of Dr K.L. Saxena of the National Environmental Engineering Research Institute (NEERI), Nagpur, as Scientist EI has been announced [CN, 31(1981), 167].

Dr Saxena (born 12 Nov. 1934) obtained first class master's degree in biochemistry in 1958 and Ph.D. degree in 1962, both from the Nagpur University. With NEERI since 27 August 1962, Dr Saxena has specialized in industrial waste treatment. Under a bilateral aid award of the New Zealand government, Dr Saxena completed a nine-month training under Colombo Plan in water pollution control and industrial waste treatment during 1976-77. He was Scientist in charge of the NEERI's Jaipur zonal laboratory from April 1967 to June 1972. Has 62 research papers and 20 technical reports to his credit. □

* * *

Dr R.P. Mishra

The promotion of Dr R.P. Mishra of the National Environmental Engineering Research Institute (NEERI), Nagpur, as

Scientist EI has been announced [CN, 31(1981), 167].

Dr Mishra (born 10 Dec. 1931) received his M.Sc. (agriculture) degree in 1956 from the Banaras Hindu University (BHU) and Ph.D. in 1978 from the Orissa University of Agriculture & Technology, Bhubaneswar, for studies on the rhizosphere microflora of rice. Joining NEERI in 1959, Dr Mishra has been engaged in research on sanitary microbiology, and more recently, on recycling of sewage and industrial wastes for augmenting food production and the abatement of pollution of surface waters. Deputed to Paris in 1970, under the Indo-French Technical Cooperation Programme, he learnt the techniques employed in water purification, sewage treatment and the disposal of solid wastes. He also obtained a diploma in sanitary techniques from ASTEF/ACTIM, Paris, and made field visits to Switzerland and UK.

Dr Mishra has to his credit about 30 publications. He is a member of the Indian Association for Water Pollution Control and of the Indian Water Works Association. □

PATENTS INFORMATION**Indian Pat. 148643**

(Application No. 207/Del/78)

An improved process for the re-refining of used lubricating motor oils

B.S. Rawat, I.B. Gulati, M.K. Khanna & Guru Parshad
Indian Institute of Petroleum, Dehra Dun 248005

The increasing demands for lubricating oils and the oil crisis the world over have necessitated the conserving of the scarce oil by regenerating the used oil for reuse. All countries including India regenerate the used lubricating oils. In India, it is estimated that about 70,000 tonnes of the used oil can be made available for rerefining.

The conventional acid/clay process for rerefining used oils had been widely used all over the world. However, other

processes which eliminate the use of acid, and thereby avoid the problem of acid sludge disposal, are being worked out and adopted throughout the world.

This patented invention is a simple process comprising the use of solvent extraction technique and conventional clay treatment. In this process, the virgin/undepleted oil is extracted with a hydrocarbon solvent and the sludge is precipitated with selective chemicals, both simultaneously in a single operation. The solvent is a commercial hydrocarbon fraction whose boiling point may range from 40°C to 200°C depending on the choice of the refiner. A solvent-to-used oil ratio of 2 to 4 is sufficient. The precipitation of sludge is induced by very small doses (0.4-0.8% by wt) of selective chemicals like sulphoxides, sulphones, amines, and amides, which influence the coalescence of sludge-constituting bodies and thus carry out the effective precipitation of the sludge. The solvent dissolves the oil selectively and works as a diluent in the precipitation of sludge.

The mixing of used oil, solvent and small doses of chemicals for about 5 min. at room temperature is adequate. The separation of the transparent extract solution and the sludge is carried out preferably by centrifugation or settling. A part of the sludge is recycled into the mixing tank which enhances the precipitation of sludge.

The solvent layer containing the oil is distilled to recover the solvent for recycling. The oil is finally contacted with clays in a conventional way at elevated temperatures and under vacuum. In this operation, the gas oil is distilled off and the oil-clay slurry is filtered to give regenerated oil base stock.

The process eliminates completely the use of acid which creates problems of acid sludge disposal. The acid treatment, selectopropane, distillation and hydrofinishing steps have been replaced by a simultaneous solvent extraction-sludge precipitation step. The low solvent-to-used oil ratio (2 to 4),

extraction at room temperature, and increase in yields by more than 12%, all these improve the economy of the process. Finally, the regenerated oil meets all the physico-chemical characteristics required for a motor oil base stock. □

PATENTS FILED

604/Del/81: Improvements in or relating to a process for making laminated material using wood and anodized aluminium, B.A. Sheno, R. Radhakrishnan, S. John & V. Balasubramanian — Central Electrochemical Research Institute, Karaikudi.

610/Del/81: Process for the production of cathodic electrocoating on metal substrates of alkyl resins, S. Guruswamy, P. Jayakrishnan, V. Yegnaraman, R. Rajagopal — Central Electrochemical Research Institute, Karaikudi.

627/Del/81: An electrochemical process for the preparation of propylamine hydrochloride, H.V.K. Udupa, V. Krishnan & K. Raghupathy — Central Electrochemical Research Institute, Karaikudi.

629/Del/81: Improvements in or relating to the preparation of high build paints, K.S. Rajagopalan, S. Guruviah & V.G. Sharma — Central Electrochemical Research Institute, Karaikudi. □

ANNOUNCEMENTS

Seminar on Building Materials

A national seminar on 'Building Materials: their Science and Technology' is being organized by the Central Building Research Institute, Roorkee, in association with the Indian National Science Academy and the Institution of Engineers' Delhi Centre on 16-17 April 1982 in New Delhi.

One of the principal objectives of the seminar is to arrive at recommendations aimed at augmenting the resources of building materials, meeting the shortages of traditional building materials, and guiding the users in adopting new techniques and materials to achieve

overall efficiency and cost reduction in building construction

The seminar will cover: (i) Clay products—bricks, tiles, structural clay products, kilns, plant and machinery and alternative fuels; (ii) Cements and cementitious materials—use of OPC, PPC and masonry cements, concrete and concrete products, lime and pozzolana, lime kilns and hydrators and use of organic waste materials in the production of cementitious binders, corrosion of reinforcement, polymer concretes, and fibre-reinforced building materials; and (iii) Organic building materials—protective and decorative coatings, plastics and composite materials, timber and other wood-based products, timber seasoning, waterproofing, damp-proofing, bitumen-based materials, and use of agro and forest wastes in the production of building boards and roofing units.

Intending participants may contribute original papers in the various areas mentioned, as also papers dealing with case histories and feedback information.

Further information on the seminar is obtainable from the Organizing Secretary Dr Mohan Rai, Scientist, Central Building Research Institute, Roorkee 247 672.

Machine Tool Design and Research Conference

The tenth All India Machine Tool Design and Research (AIMTDR) Conference will be held at the Central Mechanical Engineering Research Institute, Durgapur, from 20 to 22 December 1982.

The scope of the conference includes: Machine tools—design, manufacture and performance, Precision and special machine tools, Reconditioning of machine tools, Manufacturing systems; Automation; Computer-aided design (CAD); Computer-aided manufacture (CAM); Robotics; Adaptive controls; CNC; Microprocessor control; Metal-cutting and metal-forming processes; Unconventional machining processes;

Analysis of production systems; and Metrology.

Technical papers are invited for presentation at the conference. The last date for receipt of abstracts of papers is 31 March 1982 and that for full papers is 31 May 1982.

Further details of the conference may be obtained from: The Organizing Secretary, Tenth AIMTDR Conference, Room No. A/102, Metrology Section, Central Mechanical Engineering Research Institute, Durgapur 713 209. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

ADVERTISEMENT NO. 1 82

The Council proposes to appoint a Director for the Central Leather Research Institute, Madras. The institute is engaged in (i) research and development in various areas of leather science technology, (ii) leather technology education and training, and (iii) extension work. The institute runs B. Tech. and M. Tech. courses in leather technology in collaboration with the Periyar Anna University of Technology, Madras. Facilities for research leading to Ph.D. degree are also provided.

The main areas of the work in the institute are tanning agents, finishing of leathers, collagen and polymers, leather chemicals and auxiliaries, leather machinery, tannery effluents, and byproducts. Know-how for sophisticated and fine leather footwear and leather goods which can be competitively exported to an emerging area of thrust.

The prospective Director should have high academic qualifications, an established reputation of excellence in research and development and management capability of a high order. The qualifications and experience should preferably be in leather science technology but candidates with qualifications in any of the basic or applied sciences, such as chemistry, biochemistry, and chemical engineering/chemical technology will also be considered. The Director should be able to enthuse younger colleagues and establish close relationship with users.

The scale of pay attached to the post is Rs 2500-125/2-3000 plus allowances as per the Central Government rules. Higher initial pay can also be considered. Consultancy subject to an upper limit of Rs 15,000 per year is permitted.

Free medical aid and leave travel concession are also permissible for the family. Residential accommodation in the campus is likely to be available on payment of rent.

Age should be preferably below 50 years, relaxable in deserving cases.

This is a contractual appointment initially for a period of six years. The contract is extendable and the incumbent can also be confirmed.

Those interested may kindly send in their *curriculum vitae* in the form to be obtained from the office of the Council and send the completed forms to the Chief (Administration), Council of Scientific and Industrial Research, Rafi Marg, New Delhi 110001 on or before 9 March 1982. Literature about CLRI will also be made available on request from CSIR. □

ADVERTISEMENT NO. 5 82

It is proposed to fill one post of Scientist F at the Indian Institute of Chemical Biology, Calcutta. The major areas of R&D work at the institute include: (i) Medicinal chemistry, photochemistry, steroids and terpenoids, and allied disciplines; (ii) Biochemistry, physiology, reproductive biology, and allied disciplines; and (iii) Microbiology, bacteriology, immunology, pharmacology including neuropharmacology, and other allied disciplines.

The prospective candidate will be expected to plan and guide research in biochemistry, physiology, reproductive biology and allied disciplines for better coordination of the group.

The candidate should possess high academic qualifications in biochemistry physiology and should have an established reputation of excellence in research and development and management capability of high order relevant to the needs of the work of the institute.

Age: Preferably below 50 years but the age limit can be relaxed in deserving cases.

Scale of pay: Rs 2000-125 2-2500 plus allowances at the Central Government rates. Higher initial pay can also be considered. This is a contractual appointment for a period of six years. The contract can be extended and the incumbent can also be confirmed. Other conditions of contract will be supplied on request. Other benefits include leave travel concession and subsidized housing, subject to availability. Consultancy up to Rs 15,000 per year is permitted in accordance with prescribed guidelines.

Scientists technologists interested may obtain two copies of the standard proforma for sending their *curriculum vitae* from the Chief (Administration) CSIR, Rafi Marg, New Delhi 110001. Completed *curriculum vitae* proforma should be received in CSIR on or before 16 March 1982. A brochure on the aims and objectives of the institute can also be supplied on request. □

NOMINATIONS INVITED

Shanti Swarup Bhatnagar Prizes in Science and Technology for 1982

Nominations are invited by the Council of Scientific & Industrial Research for Shanti Swarup Bhatnagar Prizes in science including engineering and technology for 1982. The prizes are to be given for research contributions made

primarily in India during the past five years. The upper age limit of nominees for the prize is 45 years.

Five or more prizes, each of the value of Rs 20,000, may be awarded annually for notable and outstanding research, applied or fundamental, in the following disciplines: (1) physical sciences; (2) chemical sciences; (3) biological sciences; (4) engineering sciences; (5) medical sciences; (6) mathematical sciences; and (7) other sciences.

Those who can make nominations include: presidents of approved scientific societies of all-India character; vice chancellors of universities; deans of science, engineering & technology, and medical faculties; directors of Indian Institutes of Technology; deans of faculties and heads of institutions deemed to be of university status; director generals of major R&D organizations such as Defence Research & Development Organisation, Indian Council of Agricultural Research, Indian Council of Medical Research, chairman of Atomic Energy Commission, Space Commission, University Grants Commission, Oil & Natural Gas Commission, etc.; directors of CSIR laboratories, Bhabha Atomic Research Centre, Tata Institute of Fundamental Research, etc.; and Bhatnagar Prizewinners. University faculties should recommend persons working in their institutions only and route the nominations through their respective vice chancellors while, the faculties in IITs should send their nominations through their directors. Directors of CSIR laboratories can nominate a candidate in the discipline of their interest, irrespective of whether they are working in CSIR laboratories or outside. Each Bhatnagar Prizewinner can send the nomination of one person for each year's award in his own discipline only. Each such nomination shall give a detailed statement of work and attainments of the nominee, and a critical assessment report (not more than 500 words) bringing out the importance of the significant research and development contributions of the nominee made during the past five years. Nominations from individuals sponsoring their own names or of others will not be accepted.

Nominations may be sent by registered (acknowledgement due) post along with 15 copies of detailed statements of work and attainments of each nominee and the discipline under which the nominee is to be considered. The attainments of the nominee during the past five years may be highlighted, and sent along with at least one set of reprints of papers published during the 5-year period. Nominations signed by the sponsors should be sent, marked 'confidential', to the Head, Extramural Research, CSIR, Rafi Marg, New Delhi 110001 and should reach CSIR by 31 March 1982.

Regulations governing the prize and the proforma for nomination may be obtained from the Head, Extramural Research, CSIR, Rafi Marg, New Delhi 110001. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

VOL 32 NO 4 28 FEBRUARY 1982

C.F.T.R. ...

Technical cooperation between Aerospace Research and Experimental Establishment of FRG and CSIR

In the framework of an exchange agreement signed in 1974 between the Government of the Federal Republic of Germany and the Government of India, a technical cooperation protocol was signed in New Delhi on 30 January 1982 between the (West) German Aerospace Research and Experimental Establishment (Deutsche Forschungs-und Versuchsanstalt für Luft-und Raumfahrt e.V. (DFVLR) and the Council of Scientific & Industrial Research.

The agreement, which was initialled by DFVLR's Chairman Prof. Dr Hermann L. Jordan and CSIR's Director General Dr G.S. Sidhu,

envisages cooperation in research and development exclusively for peaceful purposes in different areas of aeronautical science such as aerodynamics, structures, turbomachinery, systems, and materials. The cooperation will involve exchange of information, exchange of scientists, meetings of experts, provision of advisory services, and execution of joint research or development tasks.

Two projects have been initially identified for collaboration: (i) establishment of calibration standards for cascade tunnels, and (ii) flow through flared rotating turbine cascades. □

CSIR congratulated on Antarctica expedition

The successful expedition in Antarctica owes much to the Council of Scientific & Industrial Research and its constituents, namely NIO, NGRI, NPL, says Cabinet Secretary Shri Krishnaswamy Rao Sahib in a personal communication dated 15 February 1982 to the CSIR's Director General Dr G.S. Sidhu. The Cabinet Secretary also conveys his thanks through the Director General 'to all concerned who helped to make the expedition a success'.

Workshop on Cuddapah Basin

One of the richest areas of mineral deposits in Andhra Pradesh and containing the largest single deposit of barytes, of about 75 million tonnes, the Cuddapah Basin is of great scientific interest and has received much attention by geoscientists. A two-day international workshop held at the National Geophysical Research Institute (NGRI), Hyderabad, on 11-12 January 1982 reviewed the progress made so far by various investigating teams and agencies with a view to formulating the future programmes of work. Fifth in the series, the workshop was sponsored by NGRI, the National Science Foundation (USA), Unesco, and the Andhra Pradesh Akademi of Sciences.

Attended by a large number of geoscientists from USA, Australia and Japan, and representatives of NSF and Unesco, the workshop held two



Prof. Dr Hermann L. Jordan (left), Chairman of FRG's DFVLR, and Dr G.S. Sidhu, Director General of CSIR, on the occasion of signing a technical cooperation protocol between these two organizations

Inside

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technical sessions which included presentations by scientists followed by group discussions.

In his keynote address, Dr J. Swaminath, Director General, Geological Survey of India (GSI), described the spectacular features of the Cuddapah Basin and GSI's contributions in the area. A special lecture on 'Potentialities and challenges of the Cuddapah Basin' was delivered by NGRI's director, Dr Hari Narain. Prof. S. Bhattacharji of Brooklyn City University, New York, USA, presented a review paper on the Cuddapah Basin. Another review paper by Dr D.M. Boyd and coworkers, of the University of Adelaide, South Australia, dealt with the progress of work on comparison of the Cuddapah Basin with the Australian proterozoic basins with emphasis on environmental analysis of the proterozoic Cuddapah supergroup. The preliminary investigations of the proterozoic Cuddapah supergroup in the western part of the Cuddapah Basin shed new light on the paleogeography and environmental interpretation of the sequence.

Dr K.L. Kaila and Dr H.C. Tiwari of NGRI presented the results of deep seismic sounding (DSS) profiles along Kavali-Udipi and Alampur-Koniki-Ganapeswaram. Based on the DSS data and earthquake epicentral data in the Cuddapah Basin, two maps—one for the basement and the other for the moho discontinuity—showing the location of deep faults and thrusts were released. These maps reveal the deep tectonic features of the Cuddapah Basin and throw light on its evolution. Dr K.L. Kaila *et al.* discussed the tectonic features in their paper.

The total intensity aeromagnetic map of a belt (about 7000 km²) of an area adjacent to the earlier 'Operation Hard Rock' region was presented by Dr V. Babu Rao *et al.* of NGRI. According to them, the magnetics show predominant EW and NW-SE trends which seem to reflect the structural grain of the basement.

The geology and structural set-up of

the SW margin of the basin were discussed by Dr S. Balakrishna *et al.*, also of NGRI. These workers had observed a sudden increase of magnetic values in some traverses at the contact zones of Archaean-schistose and Archaean-Cuddapah formations.

Dr B.S. Gogte (NGRI) suggested a detailed petrographic examination besides physical testing for proper assessment of Cuddapah-Kurnool rocks as a construction material for civil engineering works.

Detailed field studies, including electrical, magnetic and gravity, and exploration drilling for development of mineral and groundwater resources for rural uplift in this semi-arid tropics region were recommended by Dr M.S. Bhall and coworkers (NGRI).

Prof. A. Sriramadas of the Andhra University discussed the origin of barytes in Pakhals of Shernivala in relation to vein deposits of Pulivendala and bedded deposits of Mangampet.

In their paper, Dr B.V. Satyanarayana Murty *et al.* of the Centre of Exploration Geophysics (CEG), Osmania University, showed the identification of two interfaces through spectral and other statistical analysis of gravity/magnetic data along three profiles in the northern parts of the basin.

The workshop was inaugurated by Shri P. Venkatasubbaiah, Union Minister of State for Home and Parliamentary Affairs, who urged the scientists to make efforts to solve environmental problems like pollution, deforestation, drought and the imbalances arising from extensive mining in the basin. Shri E. Ayyapu Reddy, Andhra Pradesh Minister of Law, assured financial support to the Institute of Indian Peninsular Geology (IIPG).

Dr S. Balakrishna, IIPG's honorary director, drew the attention of the state government towards development in the Cuddapah Basin and called for the setting up of a natural resources commission to exploit the resources properly. □

Library and Information Services in an R&D Organization

Seminar at IICB

As part of its silver jubilee celebrations the Indian Institute of Chemical Biology (IICB), Calcutta, organized a national seminar on 'Library and Information Services in an R&D Organization' on 26-27 November 1981. Some 150 delegates from all over the country participated in the seminar whose deliberations, spread over three technical sessions, led to a number of recommendations. More important of them are:

1. Considering the rapid growth of scientific and technical documents and availability of computers of various capacities, the seminar recommended that information services, particularly the ones serving R&D organizations, should be gradually computerized.

2. A data bank on chemical biology should be set up at IICB.

3. The inherent attributes and capabilities of POPSI, the new system of indexing, may be considered along with other depth-indexing systems.

4. In view of the escalation in the cost of publications, resource-sharing mechanisms among various groups of libraries should be developed to ensure an effective information service to users. In this direction the seminar recommended that a strong base of scientific and technical periodicals should be built up at the National Science Library of the Indian National Scientific Documentation Centre (Insdoc), New Delhi, in consultation with other libraries. The Insdoc library should have reprographic facilities to feed users.

5. Information bulletins and directories of on-going researches, based on user needs, should be brought out.

6. Recognizing that back-up services, such as translation and reprographic facilities, are essential prerequisites for rapid dissemination of information, the seminar recommended that, apart from

AUTOMATIC HAND-KNITTING MACHINE

NRDC Awardwinning Invention

the central and regional facilities, local facilities should be developed depending upon requirements.

7. Manpower development programmes may be pursued through specialized training, in-service training, and education programmes.

Prof. P.N. Kaula, of the Department of Library Science, Banaras Hindu University, Varanasi, outlined in his inaugural address, the progress of documentation and information activities at the national level with special reference to Insdoc, NISSAT and ISSDOC. To cope with the unprecedented flow of information, Prof. Kaula advocated the use of computer and other modern devices. He also dealt with the impact of computer and telecommunication technology on processing and handling information in the western countries. He emphasized the need for coordinating the existing indexing and abstracting services and providing a national bibliographical control in each subject area of research and development. He expressed the need for the setting up of a national commission on library and information services to survey the existing conditions in the field and to formulate future plans.

The Calcutta University's Vice Chancellor, Prof. R.K. Poddar, in his presidential address, stressed the need for the establishment of a regional information centre in Calcutta*.

Earlier, the IICB's director, Prof. B.K. Bachhawat, while welcoming the delegates, called for greater scrutiny and selectivity in acquiring documents because of the increasing financial constraints. He referred to the methodology evolved by the institute's library which had helped identify the core journals to be subscribed to for the research workers and as a result had led to considerable savings in the library budget. □

The automatic hand-knitting machine developed at the Mechanical Engineering Research and Development Organisation (MERADO), Ludhiana, of the Central Mechanical Engineering Research Institute has fetched this year's coveted NRDC's Republic Day Invention Award, of Rs 12,000, for its inventors Shri Hardyal Singh and Shri R.S. Kundi [CN, 32 (1982), 17].

The machine is being commercially manufactured and marketed at Rs 2,000, which is about Rs 1,200 less than the price of the only other similar machine being manufactured with foreign technical know-how.

The MERADO-developed machine can knit garments in self- and multi-coloured designs in plain, tuck and slip stitches. The machine has been provided with 12 standard selection patterns to enable knitting of numerous geometrical patterns. The patterns can also be shifted laterally (widthwise both ways) with this machine.

The selection mechanism, which has been patented, consists of a cylindrical drum with projections mounted in rows along its length under the needle bed. Other rows of projections in accordance with the desired pattern of needle selection are positioned equispaced along the circumference of the drum. The centre line of the drum is just below the butt of the needle in its rest position. Below the tails of the needles is a lifting bar which can lift all the needles

such that all of them become free of projection on the drum and the drum can be indexed about its centre or moved linearly along the needle bed. As the lifting bar is lowered, the needles settle on the drum. The ones which settle on projection have their butts lifted to full height; the butts of the others remain at normal height. As the carriage is moved across the needle bed, the raised butts slide against a high cam, bringing the needles forward to either hold-on or knit position, and the normal needles pass under this cam to meet another low cam which takes it to knitting, tucking or missing position depending upon the particular cam track used.

The machine requires very little repair and maintenance. As it is mechanically operated and as it does not incorporate any magnetic device, the machine is rugged in construction and has a very long service life.

The ruggedness of the machine and its low price make it ideal for commercial use by housewives, in rural as well as urban areas, to augment their family income. The income from the machine covers the cost of the machine in 3 to 4 months. The machine will be a boon to the unemployed as well as the weaker sections of the society to attain self-employment at a low investment.

Brief profiles of the inventors:

Shri Hardyal Singh

Shri Hardyal Singh is heading, since 1977, MERADO, Ludhiana, as its



Automatic hand-knitting machine, developed at MERADO-Ludhiana, which has won for its inventors, Shri Hardyal Singh and Shri R.S. Kundi, NRDC's Republic Day Invention Award. It can knit garments in self- and multicoloured designs and in plain, tuck and slip stitches. This low-priced machine is ideal for commercial use by housewives. Being commercially manufactured, it costs about 35% less than the machine manufactured with foreign technical know-how

*It may be mentioned that Insdoc has already established in Calcutta the nucleus of such a centre.

Scientist in charge. A graduate in mechanical engineering from the Panjab University, Shri Singh joined CSIR at MERADO-Ludhiana in 1966. Deputed on an Unesco fellowship to USA in 1973, Shri Singh studied machine design and allied subjects at Ohio State University, Columbus, Ohio, and Cornell University, Ithaca, N.Y.



Well versed in the multidisciplinary faculties of engineering, he has significantly contributed towards development of small-scale industry. Most of the industrial machines and products designed and developed by him are in commercial use. Some of these are: circular and band-saw sharpening machine; automatic assembly machine for knitting needles; 3-speed bicycle hub; embroidery machine; single-spindle automatic turret lathe; fuel-efficient LPG domestic stove; and multi-spindle reaming machine for valve guide.

Shri Singh is now engaged, along with his coworkers, in the development of high-speed industrial sewing machines, a punched-card automatic knitting machine, and a tractor-driven combine harvester. He has to his credit a number of patents and about a dozen technical papers.

Shri R.S. Kundi

Shri Rajinder Singh Kundi is the divisional head of the Metrology Laboratory at MERADO-Ludhiana since 1969. Shri Kundi joined CSIR at the Central Mechanical Engineering Research Institute, Durgapur, in 1964 after getting his diploma in mechanical engineering from the Government Polytechnic, Lucknow. At CMERI he

received advanced training in metrology and assisted in the metrological work pertaining to the development of Swaraj tractor and the development of pneumatic gauging equipment.



Since moving in 1969 to MERADO-Ludhiana, Shri Kundi has been instrumental in setting up a sophisticated laboratory for metrological measurements at the Ludhiana regional centre and extending precision-measurement services to the engineering

Mechanical device for handling and placing prefabricated components

Small-capacity hoists including the one developed by the Central Building Research Institute (CBRI), Roorkee, are available for vertical lifting of prefabricated components. Their in-depth placing at raised heights/levels presents a big problem. The only solution to the problem at present is the use of towers/derricks or other cranes available in the market, but these are expensive. With a view, therefore, to developing a simple and inexpensive device which facilitates in-depth placing of small-sized prefabricated components, CBRI took up investigation of a small-capacity handling equipment, and worked out a number of alternative arrangements. A lifting device capable of anchoring to the junction of two walls was found to be suitable. Accordingly, the institute designed and fabricated a hoisting device. Laboratory tests have shown that it is capable of lifting up to 250 kg weight and placing it up to a depth of 3 m. The lifting motion is done

industry of this region. He has been the key figure to introduce the use of pneumatic gauging in the small-scale industries of Ludhiana.

Shri Kundi has developed a simple technique for copying the manufacturing parameter from helical gears and a novel taper measuring instrument. He has been rendering shop floor consultancy to the small-scale industries for solving their production problems.

Shri Kundi has substantially contributed, as a team member, to the successful development of the multi-spindle reaming machine and the low-cost automatic hand-knitting machine.

Shri Kundi is now engaged, along with other team members, in the development of a high-speed overlock machine and punch-card hand-knitting machine. He has to his credit 5 patented inventions and six technical papers. □

by a hoist which is powered by a 2-hp 3-phase electric motor. Swivelling motion of the device and cross-travel of hoist are manually operated. The device is positioned in the corner of two walls and is additionally tied by 3-wire rope ties. After completing the lifting operation at



This inexpensive mechanical device developed by CBRI, Roorkee, for handling and hoisting prefabricated components is capable of lifting weights of up to 250 kg and placing them up to a depth of 3 m

one floor, the device is split into pieces and is shifted to the neighbouring floor. It can be used for lifting and placing up to a 4-storeyed building. Field trials on the device will be carried out shortly. □

Electro-spot tester for detection of alloying elements in steel

The properties and applications of various alloys depend upon their alloying elements. To identify and estimate the constituent elements, conventional methods of chemical analysis, instrumental techniques, etc. are costly, time-consuming and mostly destructive. Hence, metal users are in imperative need of simpler, more economic and quicker testing methods. As a first step towards meeting their needs the Central Scientific Instruments Organisation (CSIO), Chandigarh, has developed an electro-spot alloy tester for qualitative and semi-quantitative detection of various elements in steels.

The identification of elements is based on chemical colour reactions carried out with the sample on the test paper, leading to the development of the characteristic colour of the elements. Further research is directed towards developing kits for identification of elements in copper-base and aluminium-base alloys.

The steel identification kit developed by CSIO comprises an adjustable power source and various chemical solutions and can be used for rapid qualitative and semi-quantitative estimation of alloying elements like copper, nickel, chromium, manganese, tungsten, vanadium, and cobalt. Parameters like concentration of solution, current, and time have been optimized to achieve the best results.

The first indigenous identification kit of its kind, it is cheap and simple to operate. Being portable and non-destructive, this meta-spot tester can be used to identify metals in cramped position as well as in stockyards. □



The steel identification kit (meta-spot tester) developed by CSIO, Chandigarh, can be used for rapid qualitative and semi-quantitative estimation of alloying elements. Is simple, more economic and quicker-testing as compared to previous methods. Can be used to identify metals in cramped position as well as in stockyards. It is the first indigenous kit of its kind

PROGRESS REPORTS

CIMAP Annual Report 1980-81

The Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, has recently published its annual report for 1980-81, which shows that the institute continued to carry out its R&D activities in the following disciplines: Agronomy and soil sciences, Genetics and plant breeding, Plant physiology and biochemistry, Botany and pharmacognosy, Plant pathology, Entomology, Phytochemistry, and Chemical engineering. Two new disciplines, viz. Plant physiology and biochemistry and Chemical engineering, were added during the year.

In a novel experiment, a strain of *Claviceps purpurea* (ergot) from wild grass (*Arthraxon lancifolius*) was adapted on rye (*Cecale cereale*). When cultivated on rye the fungus produced two types of sclerotia; the first type contained predominantly ergocryptine, while the second type contained ergometrine as the main alkaloid. Both the strains, with high alkaloid content, are superior to the strains available in other parts of the world. Although ergometrine is a therapeutically important alkaloid and is a drug of choice for post-partum haemorrhage, 2-bromo- α -ergocryptine, a derivative of ergocryptine, has been recently found to be a promising compound for clinical application. Marketed as Parlodel, it is extremely useful for treatment of galactorrhea and parkinsonism. Ergocryptine is imported at an exorbitant price. Commercial cultivation of this strain would go a long way in stopping its import.

The CIMAP's regional centre at Kodaikanal in Palni Hills of Tamil Nadu observed that two consecutive crops of ergot could be taken from the same piece of land in a year. The climate of the region has been found to be unique in this respect as only one crop is reported to be taken in European countries and in the Kashmir Valley.

This observation will prove a boon to the farmers of the area. Instead of one crop of potato or cabbage, they can now get a crop of ergot after harvesting the food crops. It was also observed that both peppermint and bergamot mint could be produced commercially in the Palni Hills.

Two experiments on optimum spacing and fertilizer requirements of peppermint and Japanese mint were completed. The optimum planting time for Japanese mint in north Indian plains was also worked out. Agronomic experiments on fertilizer requirements of citronella and palmarosa were carried out for the southern region at the regional centre at Bangalore.

Experiments on the fertilizer requirement of Mexican yam (*Dioscorea floribunda*) for the north Indian plains showed that 200 kg of nitrogen and 50 kg of phosphorus per hectare gave maximum yield of tubers in Uttar Pradesh. Attempts made to find out an efficient method of fertilizer application for citronella indicated that three split applications starting after sprouting were sufficient to give optimum yield of essential oil. It was also observed that neem-coated urea, which prevented loss of nitrogen, was superior to uncoated urea for nitrogen requirement of the crop. Optimum nitrogen requirement for palmarosa was also worked out for the plains of Uttar Pradesh.

The application of Diuron (2 kg a.i./ha) for the chemical weed control for citronella was found to give optimum control of weeds in that crop. Nutsedges (*Cyperus rotundus*), a pernicious weed, could be effectively controlled by the application of 2,4-D with 1.5% cane sugar solution. The control of nutsedges is a problem in most of the crops, as these are resistant to most of the common weedicides.

The optimum fertilizer requirement for *Costus* sp., a source for diosgenin, was also worked out. It was observed that 150 kg of nitrogen and 80 kg of potassium per hectare give maximum yield of tubers under conditions

obtaining in Lucknow. Optimum nitrogen and spacing requirements for Egyptian henbane (*Hyoscyamus muticus*), a crop recently introduced in India, were also determined. Application of 160 kg of nitrogen per hectare and a spacing of 45 × 30 cm resulted in maximum yield of the crop.

A pilot-scale experiment carried out in Kashmir indicated that lavender oil could be produced in the valley on a commercial scale. Both the crop and the oil were comparable to those produced in Europe. A 4-ha plantation has already been established and trial marketing of lavender oil showed that it was acceptable to the industry. So far, lavender oil is being imported at a cost of more than Rs 20 lakh annually.

Similarly, 1-ha plantation of clarysage (*Salvia sclarea*) was established and 2.50 kg oil was produced and sold to perfumers. The oil was reported to be comparable to that produced in Europe. The climate of Kashmir Valley is such that both clarysage and lavender could be produced commercially even on marginal and poor lands where no irrigation facilities are available, and India could easily become an exporter of these two important oils.

The commercial unit of Jammu & Kashmir produced a number of medicinal products, which include pyrethrum oleoresin, ergot of rye and belladonna and their alkaloids, and hyoscyamine. These were supplied to pharmaceutical industries. This unit is the sole producer of these items in the country.

Under its rural development programme the institute produced citronella on poor farmers' fields in Bangalore area. The farmers were provided distillation as well as marketing facilities. In Kashmir Valley, a large number of farmers were involved, for the first time, in the production of pyrethrum, which was so far restricted to government farms. Similarly, a large number of farmers were provided technical help for the production of ergot in the valley, and ergot worth Rs 5

lakh was produced by them.

The laboratories and offices of the institute were shifted to the new campus (P.O. Faridinagar, near Kukrail Picnic Spot, Lucknow 226010) in December 1980. □

Toxicology Data Sheets on Chemicals: Aldrin

The fifth data sheet in the series 'Toxicology Data Sheets on Chemicals' being compiled by the Industrial Toxicology Research Centre, Lucknow [see CN, 31 (1981), 14] has been devoted to Aldrin. The data sheet (mimeographed) contains a brief account of the chemical characteristics and toxicological effects. References (122) to literature pertaining to the chemical are also included. The data sheet is obtainable (free of charge) from: The Director, Industrial Toxicology Research Centre, Lucknow 226 001. □

Binder Economy and Alternative Binders in Road & Building Construction

Symposium Proceedings

The Central Road Research Institute (CRRI), New Delhi, has published two volumes of the proceedings of the national symposium on Binder Economy and Alternative Binders in Road and Building Construction, held at New Delhi on 3-4 November 1981 [CN, 32 (1982), 17]. Volume I contains the research papers under four sections: Binder economy techniques for hydraulic and other cementitious binders; Alternative hydraulic and other cementitious binders; Binder economy techniques for hydrocarbon binders; and Alternative hydrocarbon binders. The deliberations and recommendations of the symposium constitute the second volume.

Together the two volumes cost Rs 200, US \$ 50.00 (including packing and despatching charges by airmail). Enquiries relating to the publications may be addressed to the Director,

Central Road Research Institute, New Delhi 110020. □

DEPUTATION BRIEFS

Dr D. Sen of the Standards Division of the National Physical Laboratory, New Delhi, attended an advanced course on 'Quantum Metrology and Fundamental Physical Constants' held during 16-28 November 1981 at Erice, Italy. The main emphasis of the course, reports Dr Sen, was on the theoretical basis of the physical phenomena used to realize the system units for measurement. Also included were lectures on recent measurements of fundamental physical constants, their role in the realization of the system of units and on measurement techniques, particularly for electrical parameters.

* * *

Shri A.K. Bhandari of the Medical Electronic Instruments Division of the Central Scientific Instruments Organisation, Chandigarh, attended a college on 'Microprocessors Technology and Applications in Physics' held at the International Centre for Theoretical Physics (ICTP), Trieste, Italy, from 7 September to 2 October 1981. The college consisted of lectures as well as practical exercises. During the practical exercises the trainees, reports Shri Bhandari, used the host computer based development system which had the advantage of enormous computing power available from the computer centre. ROSY (Resident Operating System) was used as the development tool for the M 6800 system situated between kits MEK 6802D5 and CDC Cyber computer of Trieste University.

Shri Bhandari brought with him from ICTP a used MOTOROLA 6802 kit for teaching purposes. □

Chinese delegation visits NGRI

A five-member Chinese delegation from Academia Sinica, led by the academy's Vice President Dr Li Xun, visited the National Geophysical

Research Institute, Hyderabad, on 8 January 1982. The delegates were apprised of the various R&D facilities developed and available at the institute and were taken round its divisions.

* * *

Visit of Saudi Arabia's Board of Science & Technology Chairman

Dr Rida M.S. Obeid, Executive Director and Chairman, Board of Science & Technology, Saudi Arabia, visited NGRI on 27 January 1982. Dr Obeid showed considerable interest in NGRI's R&D activities relating to airborne geophysical surveys, ground-water exploration and management, and deep seismic sounding. □

PERSONNEL NEWS

Appointments/Promotions

Dr G.R. Venkitakrishnan

Dr G.R. Venkitakrishnan, Scientist EII, of the National Chemical Laboratory (NCL), Pune, has been promoted as Scientist F with effect from 21 December 1981.



A Ph.D. in chemical engineering from the Indian Institute of Science, Bangalore, Dr Venkitakrishnan has been with NCL since 1966. Engaged in process development and process design work, which division he now heads, Dr Venkitakrishnan has played a major role in the successful implementation of several of NCL's major technologies. He has visited, on deputation, Europe, UK, USA and Japan in connection with NCL's projects and also for discussions on research programmes in selected universities in USA.

* * *

Dr C. SivaRaman

Dr C. SivaRaman, Scientist EII, of NCL, Pune, has been promoted as Scientist F with effect from 21 December 1981.



Dr SivaRaman (born 2 Dec. 1923) obtained his Ph.D. degree in biochemistry from the University of Madras in 1949 and joined NCL at its inception.

Dr SivaRaman has specialized in enzyme chemistry and technology. He had obtained for the first time pure bacterial citrate lyase. His group has studied the structure and mechanism of action of this multienzyme complex. His recent research interests include immobilized enzymes and microbial whole cells. The usefulness of an immobilized penicillin acylase system developed in collaboration with the Hindustan Antibiotics Ltd, Pune, has been established in trials on the firm's production plant.

During 1958-60 Dr SivaRaman was associated with the researchers of the University of Leeds, England, under a Colombo Plan programme. In 1977 he visited, and lectured at, universities and research and development groups in USA under the CSIR-NSF exchange programme.

Dr SivaRaman, who heads NCL's Biochemistry Division, is a fellow of the Indian Academy of Sciences and a member of the national committee of International Union of Biochemistry.

* * *

Dr P. Ratnasamy

Dr Paul Ratnasamy, Scientist EII, of NCL, Pune, has been promoted as Scientist F with effect from 21 December 1981.



For an account of Dr Ratnasamy's scientific and professional attainments, see CN, 31(1981), 110. □

Honours & Awards

Dr R.L. Thakur

Dr R.L. Thakur, Emeritus Scientist, Central Glass & Ceramic Research Institute, Calcutta, has been elected a fellow of the American Ceramic Society. The fellowship will be formally conferred on him at the society's 84th annual meeting in May 1982.



Dr Thakur is engaged in the development of glass-ceramics and materials for electrical uses and studies in the basic principles involved. Along with his coworkers he has developed heat-absorbing glasses, zero thermal expansion glass-ceramics, photochromic glasses, machinable glass-ceramics, wall tiles from phosphorus plant slag, and abrasion-resistant glass-ceramics from blast furnace slag.

* * *

IETE award to NPL scientists

Dr P.C. Kothari, Shri H.M. Bhatnagar, Dr V.K. Agrawal and Dr K. Chandra of the Electrical and Electronic Standards Division of the National Physical

Laboratory (NPL), New Delhi, have won the J.C. Bose Memorial Award for their research paper entitled 'A feed-through microwave power measuring transfer standard at 10.0 GHz' published in *Journal of the Institution of Electronics and Telecommunication Engineers*, 26(1980) 579-83.

The award, carrying a cash prize of Rs 1000 to be shared equally among the authors plus individual citations, was made at the annual general meeting of the Institution of Electronics and Telecommunication Engineers (IETE) held in New Delhi on 12 February 1982.

In their awardwinning paper, the NPL scientists report the establishment at NPL of a feed-through microwave power measuring standard. Calibrated against a thin-film type standard bolometer mount (calibrated by Electro-Technical Laboratory of Japan) at 10.0 GHz, its calibration factor, K_c , is 10.695%, the measurement accuracy of K_c lying between +0.70 and -0.87%. The random error in the measurement is $\pm 0.33\%$.

The feed-through power measuring system is extremely useful for determining the effective efficiency/calibration factor of unknown bolometer mounts, and for calibrating microwave power meters at 10.0 GHz up to 10 W. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH ADVERTISEMENT NO. 2/82

It is proposed to appoint two Scientists F for the National Physical Laboratory, New Delhi.

Post 1

Job requirements

The National Physical Laboratory has a statutory obligation of establishment, maintenance and updating of national standards of physical measurements at internationally accepted accuracies. The activity demands continuous research on standards and on techniques of measurement, utilizing latest techniques, very close to the frontiers of knowledge, as also liaison with international agencies engaged in this task. Nationally, the laboratory is at the apex in the hierarchy of standards and has the responsibility of calibrating the standards maintained at regional centres and at specialized institutes which require measurement standards of high accuracy.

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Internationally, there is a trend to relate physical standards to quantum phenomena. Work in this direction is being actively pursued at the laboratory.

It is a senior post in the field of standards. It will be the whole-time responsibility of the selected candidate to organize the work of creation, maintenance and improvement of primary, derived as well as transfer standards and help organize and operate the national calibration service.

Qualifications & Experience

The candidate should have high academic qualifications in physics or engineering, with an established record of over 10 years of experimental work involving precision measurements. He should have exhibited qualities of scientific leadership and innovation.

Post 2

Job requirements

The selected candidate is required to lead a team of research workers in the design and development work in physics-oriented technologies. The laboratory has a Division of Specialized Techniques which, in addition to its own research programme, acts as a central facility. These facilities include X-ray diffraction, infrared, X-ray topography, transmission and scanning electron microscopy, spectrochemical analysis and other analytical facilities.

It is a senior post and it will be the responsibility of the selected candidate to organize and operate this central facility for (i) other programmes in the laboratory, (ii) scientific and research institutes in the country, (iii) private and public industry; and (iv) government departments requiring specialized techniques, in addition to initiating research programmes.

Qualifications & Experience

The candidate should have high academic qualifications in physics/engineering with an established record of over 10 years of experimental work using any one or more of the above techniques. He should have exhibited qualities of scientific leadership and innovation.

For both posts

Scale: Rs 2000-125/2-2500 plus other allowances at Central Government rates. Selected candidates will be entitled to housing in the campus, subject to availability. Consultancy up to, Rs 15,000 per annum is allowed.

Age: Up to 50 years, relaxable in special cases.

These are contractual appointments for a period of six years. The contract is renewable and the incumbents are also eligible for confirmation in due course.

Scientists/technologists interested in the above posts may obtain the prescribed proforma, for furnishing their *curriculum vitae*, from the Chief (Administration), Council of Scientific & Industrial Research, Rafi Marg, New Delhi 110001. Completed proforma may be sent to CSIR on or before 23 March 1982. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

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Indo-German Workshop on Rock Mechanics

Under high pressures and temperatures, rock materials constituting the earth's deep interior are subjected to strange physico-chemical changes. Stress/strain may accumulate and lead to a geodynamical equilibrium or motion, which in turn causes elastic/inelastic behavioural changes in the material—rock burst or failures—or induces seismicity or even hazardous earthquakes.

The principal concern of rock mechanics is to understand the phenomenon of fracture in rocks (such as rock bursts in the Kolar Gold Mines),

measurement and study of stress/strain in rocks, and changes in mechanical behaviour of rocks, with a view to evolving safe mining methods. On the economic front, rock fracturing ('hydrofrac') could also stimulate productivity from oil/gas wells. 'Hydraulic fracturing' can also be used for measurement of the state of 'stress' in subcontinents. Recently such measurements were carried out by the National Geophysical Research Institute (NGRI), Hyderabad, deep inside the Kolar Gold Fields (KGF) in col-

laboration with the Institut für Geophysik, Ruhr University, Bochum, FRG. The stress measurements carried out at a depth of 10,000 ft inside the Kolar mines are a world record in respect of depth.

It was in this context that a workshop on 'Rock Mechanics' sponsored by CSIR (NGRI) and Internationales Büro, Kernforschungsanlage, Jülich, was held at NGRI on 12-13 October 1981. Some 40 scientists from research organizations, teaching institutes, mining industries of India and four scientists from FRG's universities participated in the workshop, at which 32 papers were presented and discussed.

Prof. S. Nurul Hasan, CSIR's Vice President, who inaugurated the workshop, said that the earth sciences had not received due attention the world over, and had received much less in India and that today scientists seemed to know more about the moon than the planet earth. Earlier, Dr Hari Narain, NGRI's Director, welcoming the delegates, recalled the growth of earth sciences in the country and reviewed the status of geophysical research.

Prof. F. Rummel of Ruhr University presented to Prof. Nurul Hasan a report covering the analysis of the first results of stress measurements obtained in Kolar mines. Dr Ursula Kleinhans of



On the occasion of the inauguration of the Indo-German workshop on Rock Mechanics. Seen in picture are (from left) Prof. F. Rummel, Institut für Geophysik, Ruhr Universität, Bochum, FRG (speaking on the podium); Dr Hari Narain, NGRI Director; Prof. S. Nurul Hasan, CSIR Vice President; and Dr Ursula Kleinhans of KFA.

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KFA dealt with their collaborative activities and gifted a set of projection equipment for presentation of scientific data. Mr Von-Mettenheim, First Secretary in FRG Embassy, referred to the growing mutual scientific collaboration between the two countries.

Technical Sessions

The deliberations of the workshop were spread over four technical sessions. Prof. F. Rummel chaired the first session dealing with 'Fracture and friction in rocks'. Prof. J.C. Roegiers (University of Toronto, Canada) chaired the second session devoted to 'Hydraulic fracturing as applied to oil and gas industry'. 'Stability of underground structures' was discussed in the third session chaired by Shri M.R. Sathaye (Singareni Collieries Co. Ltd). The fourth session 'Mining and reservoir-induced seismicity' was conducted under the chairmanship of Shri V.S. Krishnaswamy (GSI).

Dr T.N. Gowd and S.V.S. Rama Rao and K.B. Chary (NGRI) discussed in their paper the laboratory investigations carried out on the mechanical properties of rocks comprising schists, pegmatites, and gneisses from Champion Reef Mines and KGF. Their critical examination of the stress pattern of these rocks under uniaxial and triaxial compression tests conducted at different pressures has shown that the coefficient of internal friction of these rocks varies from 1.00 to 1.30.

Dr T.N. Gowd (NGRI) and Dr F. Rummel (FRG) *et al.*, presenting hydrofrac data measured in KGF at depths of 590 and 1044 m, reported that the direction of the major horizontal principal stress is at an acute angle to the major MNW-SSE fault system in KGF. Though it does not agree with the general plate tectonic view associated with the drift direction of the Indian subcontinent, the stress magnitudes explain, according to them, the absence of tectonic activity in this region.

'Methods of working and ground support system for safe and economic

mining' was the subject matter of a paper by Dr T.N. Gowd (NGRI). It was based on experimental data concerning the ground movement observed in standard stopes like breast stopes, room and pillar stopes. The working principle and performance of the friction rock stabilizers and screw-coupled rock bolt developed at NGRI were also explained.

Dr T.N. Gowd and Shri Rama Rao (NGRI) discussed the technical details of the ground movement monitoring devices developed at NGRI for understanding the structural behaviour and detecting instabilities in the early stages of their development. Stress meters, extensometers and other such devices which can operate reliably in underground mines are not indigenously available.

'Mining and reservoir-induced seismicity' was the topic of a full session. Dr M.V.M.S. Rao and Dr T.N. Gowd (NGRI) presented a review of analysis of results from a few case studies in metal- and coal-mines. They outlined the working principles of the monitoring system in their paper on 'Application of seismo-acoustic techniques to monitor the strata conditions in mines'. Dr Harash K. Gupta (NGRI) presented some interesting results on earthquakes of magnitude ≥ 4 , their foreshocks, and aftershocks patterns (1973 through 1975) in the Koyna region of Maharashtra. N-S trending fault at $73^\circ 45'E$ is inferred from the location of hypocentres. Composite focal mechanism solutions deduced for eight sequences were found to be in agreement with N-S trending fault. In his paper 'Reservoir-induced seismicity in S.Carolina, USA', Dr B.K. Rastogi (NGRI) presented details of seismicity and its relationship with water levels.

Papers from other Indian institutions like the Banaras Hindu University (BHU), Indian School of Mines, University of Roorkee, Bharat Gold Mines Ltd (BGML), Hindustan Zinc Ltd, Indian Institute of Technology (Delhi), Jodhpur University, and Bhabha Atomic Research Centre

(BARC) discussed the problems of *in-situ* stress measurements, rock burst problems in mines, stability of underground rock structures, fracture and strength of rocks, seismic and rock burst studies, time-dependent behaviour of rocks, and other related topics.

Prof. B.B. Dhar *et al.* (BHU) presented the results obtained from model studies to understand the mechanism of rock fracture around underground openings. Dr D.P. Singh (BHU) dealt with various aspects of creep and described laboratory methods of studying the time-dependent strength and strain of rocks.

Shri R. Krishna Murthy and Shri K.S. Nagarajan (BGML, Kolar Gold Fields) presented some of the problems of rock bursts and their characteristics, including two major rock bursts which occurred in KGF, and also discussed the improvements, consistent with safety, made to the mining system. Dr S.K. Arora (BARC) presented some interesting results dealing with the delineation of rock burst-prone regions in the underground mines of KGF.

The German delegation presented eight papers on fracture and friction in rocks, fracture and friction experiments at high temperatures and pressures, hydraulic fracturing, support structure interaction and a review of hydraulic fracturing models for oil and gas stimulation, evaluation of the stability of underground cavities, rock anchoring, and theoretical friction models.

Dr H.J. Alheid focused the various aspects of rock friction, and, in particular, the extent of dilatancy during frictional sliding along pre-existing shear planes and on the influence of temperature and pressure on the transition from stable to unstable frictional sliding.

Recommendations

The upshot of the workshop was a resolution that, in order to implement the various recommendations/suggestions, a national project on rock mechanics should be formulated on the

basis of the discussions and that the Government of India should be approached for necessary funds and other assistance. A committee would be convened by Dr T.N. Gowd of NGRI for implementing the recommendations.

UNIDO Workshop at NML

That a regional centre for cooperative research and development should be established was the centre-piece recommendation of a UNIDO workshop held at the National Metallurgical Laboratory (NML), Jamshedpur, during 7-11 December 1981. The workshop titled 'Regional Project for Cooperative Research and Development Centre in Asia and the Pacific' was attended by 28 participants from ten countries: People's Republic of China, Czechoslovakia, Egypt, India, Korea, Nigeria, Pakistan, Philippines, Sri Lanka, Thailand, Turkey and Yugoslavia.

Dr B.R. Nijhawan, a former Director of NML and now Senior Inter-regional Adviser, Metallurgical Section, UNIDO, explained the objectives of the

workshop, and outlined UNIDO's activities on regional projects covering metallurgical industries. To promote cooperation among metallurgical R&D centres in ESCAP region, Dr Nijhawan suggested: (i) exchange of technical publications and documents; (ii) formation of joint research teams from different R&D centres on joint projects identified by one or more existing centres; and (iii) formation of a nucleus at an existing centre. The UN may then consider the establishment of a new regional centre at a commonly accepted location/country, he added.

The NML's director, Prof. V.A. Altekar, who was chairman of the workshop, in his address gave an account of UNIDO's assistance to his laboratory. The central creep testing facility set up at NML with the assistance of UNDP and UNIDO, Prof. Altekar said, was continuing to develop indigenous high-temperature creep-resistant steels for power plants, atomic research centres, and other such units.

ration accurately can be achieved by this technique.

The basic steps involved in the process are:

*Grinding of coal in a ball/rod mill either in dry or in wet condition. In the case of a natural slurry the grinding operation can be avoided.

*Conditioning of the ground coal or natural slurry at 30-40% solid consistency with 1-2% of diesel oil under controlled pH (alkaline for coking coals and acidic for non-coking or oxidized coals).

*Diluting the conditioned slurry to 15-20% solid consistency and subjecting it to high-speed agitation in a specially designed tubular vessel with stirrer-baffle arrangements and simultaneously adding furnace oil/tar oil (acid-free) at a dose of 5-10% by weight depending on the nature of coal. At this stage, the coal particles agglomerate and the minerals remain in suspended condition.

*Separation of the agglomerates from suspended minerals on an arc-screen-cum-vibrating screen. The oiled agglomerates dewater easily on overnight storage.

This technique may be conveniently used for the beneficiation of washery slurry in an efficient manner as well as for upgrading high-ash coals/middlings for metallurgical use. Based on CFRI technology, a 2-tonne/hr agglomeration plant has been installed at Lodna Washery of Bharat Coking Coal Ltd for upgrading a part of the washery slurry but this plant has additional provisions for beneficiation of middlings/raw coals after finer grinding.

Integrated circuit for commercial application

With the development of this technique for treatment of fine coals, a simple washing circuit for effective beneficiation of difficultly-washing high-ash coking coals on an industrial scale has been developed. The integrated circuit (flow-sheet) comprises less sophisticated units like conventional jigs for initial separation of cleans, midd-

IMPROVED PROCESS FOR DEMINERALIZATION OF COAL BY OIL AGGLOMERATION

NRDC's Awardwinning Process*

During recent years attempts have been made in a number of countries to develop an efficient technique for the recovery, upgrading and dewatering of fine coal. In countries like India where the mineral matter in coal remains finely disseminated throughout its mass, finer crushing/grinding often becomes imperative for proper release of minerals from coal. In such cases, efficient separation of the liberated coal from minerals not only becomes difficult but also entails serious problems for their subsequent dewatering. The improved oil agglomeration technique developed

at the Central Fuel Research Institute (CFRI), Dhanbad, through long and intensive R&D provides the best solution to all such problems.

The Technique

When a mixture of pre-conditioned slurry of fine coal (natural or prepared) in water having a specific pulp consistency and a controlled pH is vigorously stirred in the presence of certain oils, the coal particles agglomerate, leaving the non-combustible minerals in suspended condition, and thus it becomes possible to separate the agglomerates subsequently over a screen of a suitable mesh size. The formation of agglomerates is attributed to the specific surface characteristics of the coal particles having selective affinity for oils and so a relatively high-degree sepa-

* This process has won for its inventors this year's Republic Day Award of the National Research Development Corporation of India (NRDC). The recipients of the award are Shri G.G. Sarkar, Shri B.B. Konar, and Shri Sukdob Sakha of the Central Fuel Research Institute, Dhanbad, who share Rs 25,000. [CN, 32 (1982), 17]

ings and rejects from the raw feed crushed to -13 mm or below. The middlings on grinding to below 0.1 mm and the slurry from these jigs are subsequently treated by the oil agglomeration technique for recovering additional clean coal and high-ash rejects.

Any coal which gets misplaced in the middlings in the course of separation in jigs as well as the coaly matter released from normal middlings is completely recovered during the agglomeration stage. By application of this integrated system, inferior-grade coking coals which normally give 35-40% recovery of cleans at 17-18% ash level in sophisticated circuits incorporating HMS cyclones and flotation cells can yield almost 100% increase in clean coal recovery at equivalent ash level. Moreover, because of the easy dewatering characteristics of the cleaned product, the free moisture content of the combined cleans after centrifuging can be well below 8%. In such circumstances, the cost of production per tonne of clean coal will be much lower than that obtainable by conventional techniques.

The application of the integrated scheme can have several distinct advantages:

* Simpler component units and hence less capital investment

- * Fewer operational and maintenance problems and hence increased availability and higher utilization of plant capacity

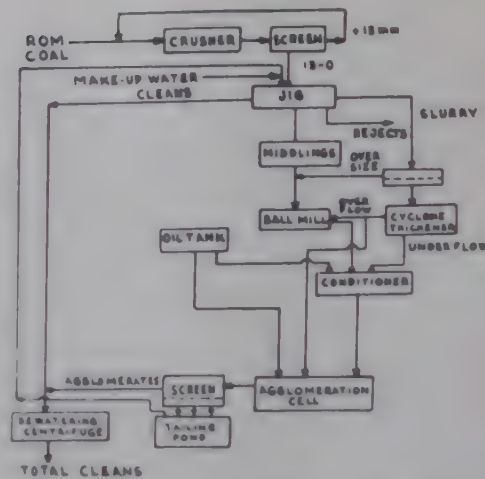
* Elimination of costly vacuum filters

* Minimization, if not complete elimination, of costly provisions for thickening of slurry

* Sizeable increase in the recovery of clean coal

* The process steps involve selective preparation of petrographic constituents of coal, which is conducive to improved coke-making.

* Practically the whole of the oil used in the process remains associated with the agglomerates and improves the coking characteristics of sub-standard coking coals. Nearly 80% of this oil is



Flowsheet—Jig-cum-agglomeration circuit

recovered in the form of oil or gas during the carbonization stage.

*In the beneficiation of very difficultly-washing coking coals the adoption of jig-cum-agglomeration circuit will be more economical as the overall cost of washed coal will come down by nearly Rs 200 per tonne even if no credit is given to the fuel value of oil present in the agglomerates.

Other potential fields of application of the oil agglomeration technique are:

• Preparation of coals for thermal power plants, where high-ash coals containing excess amounts of free silica cause erosion problems and where

burning of 8-10% oil is also a common practice. While this may call for suitable devices in feeding oil-agglomerated cleans or for de-oiling and de-agglomerating the coal before feeding, it will ensure better efficiency and availability and cause less of maintenance hazards.

* Preparation of low-ash coal from weakly caking or non-caking coals for direct injection in blast furnace to reduce the coke rate.

* Reduction in the consumption of oil in oil-fired furnaces by using coal-oil mixture. Low-ash agglomerates may be used in such mixtures.

* In the manufacture of synthetic oil the finely ground raw coal can be properly beneficiated by this technique with the use of recycle oil without involving any extra cost on the grinding and addition of oil.

* Integrated beneficiation of deshaled coking coals/non-caking coals at pit heads and economic transportation of agglomerated mass to steel plants/power plants through pipelines. The agglomerated cleans, being lighter and spherical, will consume less power and cause less erosion in pipelines. They can also be dewatered easily at the consumer's end.



A view of the 2-tonne/hr pilot plant at Lodna washery of Bharat Coking Coal Ltd incorporating the agglomeration cells. Based on CFRI technology, the plant upgrades part of the washery slurry; it has additional provisions for beneficiation of middlings/raw coal after finer grinding.

Brief profiles of the inventors:**Shri G.G. Sarkar**

Born in Bolpur (West Bengal) in 1922, Shri Sarkar had his early education in Bolpur and Santiniketan and graduated from the Calcutta University in 1943 with honours in chemistry.



After working in Burn and Co. Ltd, Raniganj, and later in the Indian School of Mines, Dhanbad, Shri Sarkar joined CSIR in 1947 as a research assistant. With CFRI since 1948, he became Scientist F in 1976. Since 1952 he has been working as chief of the CFRI's Coal Preparation Division, and during 1977-81, he was also the chief coordinator of CFRI's Coal Survey Laboratories. Shri Sarkar was Acting Director of CFRI for some time in 1978-79. He was honoured with director's grade in 1981.

Deputed to USA in 1956 under TCM Programme, he studied the design and operation of coal-washing plants and was awarded a 'Certificate of Merit' by the U.S. Bureau of Mines. In 1960 he went to Poland and Yugoslavia as a member of the technical delegation of the Government of India. Subsequently Shri Sarkar visited several countries including UK, France, West Germany, Holland, Belgium, Czechoslovakia, Australia and USSR either on invitation or as a delegate to international forums on coal preparation. He was on the organizing committee and secretariat of the fifth, sixth and seventh International Coal Preparation Congresses, and contributed seven basic research papers between 1962 and 1979. At the eighth Congress held at Donetsk (USSR) in 1979, Shri Sarkar chaired a technical session.

Shri Sarkar has assisted in the planning of several coal washery projects in India, and has been responsible for conducting guarantee and performance tests on a number of washeries under operation. His services were also requisitioned for conducting technical probes in some thermal power stations and in formulating standards for coal preparation practices for Indian coals.

In 1969-70 Shri Sarkar received the National Mineral Award for significant contributions in coal preparation. He has also to his credit more than 180 papers, six patents and a monograph 'Studies on Coal Preparation in India'. Beneficiation of low-grade coals by oleo-floatation or oil-agglomeration techniques has been one of his major activities for the last one decade.

Shri B.B. Konar

Shri B.B. Konar (born 1937) obtained his B.Sc. degree from the Calcutta University with distinction and passed an advanced fuel technology course. He is a member of the Indian Institute of Mineral Engineers. At present his

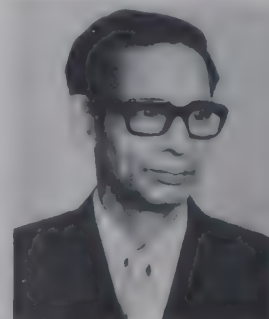


researches at CFRI relate to the oil agglomeration process and its upscaling through pilot plant developments. Coordinator of the oil agglomeration project, he has 20 research papers and three patents to his credit.

Shri S. Sakha

Shri S. Sakha (born 1926), on graduation from the Calcutta University, joined CFRI in 1952 and since then has been engaged in the beneficiation of

Indian coals. He was associated with the planning of all the coal washeries in India and their performance evaluation.



Upgrading of sub-standard coking coals by oil agglomeration for metallurgical use is his present research interest. He has published 24 research papers and compiled 60 technical reports. He is the sectional head of CFRI's Coal Washing Division. □

NEERI's permanent air quality surveillance system at Taj Mahal

The National Environmental Engineering Research Institute (NEERI), Nagpur, has set up a permanent air quality surveillance system at Taj Mahal, Agra. It is an automatic analyzer for continuously recording sulphur dioxide levels with a view to monitoring air quality in the vicinity of the monument.

Prof. S. Nurul Hasan, CSIR's Vice President, visited the site on 16 January 1982. □

SERC Courses

The Structural Engineering Research Centre (SERC), Madras, organized an advanced course on Precast Concrete from 28 December 1981 to 8 January 1982. Thirty-two lectures were delivered covering various aspects of precast concrete construction.

Forty-three participants, including two from Iraq and one from Kuwait, attended the course.

An advanced course on Developments in Structural Composites and Concrete Technology was held at the Structural Engineering Research Centre (SERC), Madras, during 12-23 October 1981. □

SPECTROSCOPY AND PHYSICAL CHEMISTRY OF BIOMOLECULES

Bhatnagar Prizewinner Prof. Balasubramanian's Work

Prof. Balasubramanian's research activities have been in the area of molecular biophysics, specifically biophysical chemistry and spectroscopy. His particular emphasis has been on aspects of biomolecular conformations, interactions and aggregation, hydrophobic effect and the role of water in biological



systems, and modelling biological membranes. The long-range objectives have been: (i) to study the nature of weak interactions within, and between the molecules and their consequences on the conformation and structure, and on the spectral and bulk properties of these systems; and (ii) to understand the basis of biological functions of proteins and peptides through a study of their conformations in solution. These have involved the use of not one, but a variety of methods and techniques—thermodynamic, hydrodynamic, and spectroscopic. In this connection, Prof. Balasubramanian has been one of the pioneers in India in the use of circular dichroism and optical rotatory dispersion (CD & ORD), NMR and ESR relaxation methods, and photoacoustic spectroscopy (PAS) in biology.

Prof. D. Balasubramanian of Centre for Cellular & Molecular Biology, Hyderabad, has been chosen for the 1981 Shanti Swarup Bhatnagar Prize in chemical sciences (along with Prof. B.M. Deb of the Indian Institute of Technology, Bombay) [CN, 31 (1981), 177].

In the area of CD spectroscopy of biopolymers, he was able to reveal the geometrical requirements in cyclic peptides that lead to exciton splitting of CD bands as prototypic helical systems. He also introduced two new transparent and versatile solvents that can be used in spectroscopy of polypeptides. His paper on the CD spectra of unordered polypeptides and proteins settled the controversy on the issue and paved the way for conformational analysis of proteins in solution, using CD. Again, by the extensive use of CD spectroscopy, his group was able to delineate the solution conformations of two peptide antibiotics, gramicidin S and cyclic linopeptide, and was able to correlate the conformational flexibility of these molecules and their analogues with their biological activity.

The effect of protein denaturants such as urea on the structure of solvent water and on the hydrophobic effect was effectively studied by Balasubramanian and his group by using both thermochemical and ESR spin label studies. He used the novel approach of monitoring the flickering cluster equilibrium in liquid water and the alteration of the populations of the microphases in water by using an ESR spin probe as a 'Maxwell Demon' that follows the changes in the microviscosity of the medium. The results helped establish that urea breaks water structure at relatively low concentrations while fatty acid salts increase the structure—confirming the picture that was suggested by thermochemistry, but was not possible to establish without this 'real-time' approach. The basis of hydrophobic interactions in diverse phenomena such as the binding of general anesthetic agents to globular proteins, the aggregation and thermal precipitation of a variety of biopolymers in aqueous solution, and also on the effect of additives on consolute liquid

pairs was established by Balasubramanian's group. In the latter, they were able to trace deviations from the Prigogine and Timmermans rules displayed by aqueous binary liquid mixtures as due to entropy effects arising from the structure of water and the hydrophobic effect. Using this system they were able to show the thermodynamic basis of action of the Hofmeister series of ions on protein structure.

In the area of the aggregation of surfactants and membrane lipids into micelles, reverse micelles and liposomes that his group started working with over six years ago, they have been able to do an extensive study of reverse micelles as models for biological aqueous pockets such as the cytoplasm, the mitochondrial matrix and the interior of chloroplasts. They have been able to show that the conformation of the lipids in reverse micelles is essentially the same as in micelles, liposomes and bilayer membranes and the nature of encapsulated water pool to be extremely interesting. They have been able to solubilize proteins within the water pools and found them to be native in conformation and biologically active. The exciting possibilities of reverse micelles and the water pool are being pursued vigorously in this laboratory currently. Such studies have involved the use of techniques such as NMR and ESR relaxation methods, fluorescence and hydrodynamics as well as biochemical assays. They have also been able to use such synthetic membrane models for photoregulating the lipid packing and the activity of an imbedded enzyme by doping the system with the photoisomerizable compound azobenzene. The extent of water penetration in such assemblies as micelles, reverse micelles and liposomes has been studied and it appears as if these might not be porous to water in their interiors.

A recent interest that Prof. Balasubramanian and his group have been pursuing with considerable vigour is the application of photoacoustic

spectroscopy (PAS) in biological systems. His group has used PAS to study a variety of problems of chemical and biological interest. They have been able to monitor the surface acidity of catalyst particles and show that three such types of acid sites occur in silica-alumina—a problem considered difficult by conventional means. They have also been able to study all the features of the solid-state photopolymerization of a single crystal of the monomer diacetylene *in situ* by PAS and have established the order and rate of the reaction, the calorimetry of the process, the action spectrum, the conformation and orientation of the polymer on the monomer crystal and other features. Use of the PAS technique to such a system has been novel and has been able to answer several questions in a far more convenient fashion than conventional methods. In biological systems, they have been able to study the intact malarial parasite and the effect of antimalarial drugs on the parasite directly *in vivo*. The interaction between the pigment contained in the food vacuoles of the parasite and the antimalarial drug is indicated by such studies. They are also working on the photosynthetic process exhibited by blue-green algae and are hoping to do a total thermodynamic book-keeping of the process *in vivo*, by following the PAS and fluorescence spectra, inhibiting the various reactions at specific stages by using appropriate poisons and calculating the energy of the photophosphorylation therefrom.

Born in Sholavandan, Tamil Nadu, on 28 August 1939, Balasubramanian obtained his B.Sc. from Presidency College, Madras, in 1957 and his M.Sc. in chemistry from Birla College, Pilani, in 1959 with a first class first rank in the Rajasthan University. Proceeding to the Columbia University, New York, USA, he earned his Ph.D. degree in chemistry in 1965. Availing himself of the Jane Coffin Childs Foundation Medical Research Fellowship offered, he worked on protein conformations and in-

teractions at the Department of Biochemistry of the University of Minnesota Medical School. Returning to India in early 1967 he taught and pursued his research for ten years at the Department of Chemistry, Indian Institute of Technology, Kanpur. In 1977 he moved to the newly established University of Hyderabad, School of Chemistry, where he helped set up a sophisticated analytical instruments laboratory. In 1980 he moved to CCMB. He continues to teach at the University of Hyderabad.

Prof. Balasubramanian is an elected member of the Guha Research Conference in Biology, a fellow of the Indian Academy of Sciences, and a member of the INSA national committee in biophysics. He is recipient of the Yeddanapalli Medal for 1977 of the Indian Chemical Society for his work in biophysical chemistry. He has been a visiting scientist at the National Institutes of Health, USA, and a visiting professor at the Department of Biochemistry of the Mahidol University, Bangkok. He is on the editorial boards of *Journal of Biosciences* and of *Indian Journal of Chemical Education*. □

PERSONNEL NEWS

Dr S. Kumar appointed CGCRI Director

Dr S. Kumar, Acting Director, Central Glass & Ceramic Research Institute (CGCRI), Calcutta, has been appointed Director of the institute (29 Oct. 1981).



Dr Sachchidananda Kumar (born 15 Aug. 1928) graduated with honours in chemistry from the Calcutta University, and obtained his Ph.D. degree in glass

technology from the University of Sheffield in 1950. He also holds the D.Sc. (Tech.) degree of the University of Sheffield which he earned in 1969 for his researches on chemistry of glass.

Prior to joining CGCRI in 1952, Dr Kumar had worked at A.B. Surte Glasbruke, Sweden (1950-51) and AG der Gerresheimer Glashuttenwerke, Düsseldorf, FRG (1951).

Dr Kumar's major research interests relate to glass formation, optical absorption in glass, thermal and electrical properties of glass, viscosity of glass, and analytical chemistry. He has contributed significantly to industrial research relating to fibreglass, silicates from rice husk, glass-ceramic compositions, glass-to-metal seals, and non-crystalline ceramics.

On the invitation of the governments of Sri Lanka and Tanzania, he visited these countries in 1974 and drew up project proposals for setting up glass industries in these countries. He visited Canada, USA and UK as a Colombo Plan fellow in 1964 and as a UN fellow in 1977 and 1981. He visited Romania under the Exchange Programme of Scientists.

Dr Kumar is recipient of a special award from the Indian Ceramic Society for his outstanding contributions to the science and technology of ceramics (1970). He was president of the Indian Ceramic Society for 1980-81, and honorary editor of *Transactions of the Indian Ceramic Society* during 1959-77. A founder-fellow of the Indian Institute of Ceramics, he was its honorary secretary during 1978-81. He is on the board of management of two public sector glass units.

Dr Kumar has to his credit 61 research papers, besides a number of review articles, and four patents. □

Appointments/Promotions

Dr Indradev

Dr Indradev of the Administrative Staff College of India (ASCI), Hyderabad, has been appointed Scientist F at CSIR Headquarters, New Delhi (17 Dec.

1981). His assignment includes assisting the Director General, CSIR, in the planning and coordination of the Council's major projects. The appointment is on an *ad-hoc* basis.



After obtaining his M.Sc. degree in physics from the Allahabad University in 1950, Dr Indradev worked as Associate Professor in the Sagar University for 9 years. Obtaining his Ph.D. degree in solid state physics from UK, he was research associate in USA and West Germany for six years. From 1968 to 1973 he was with CSIR at the National Physical Laboratory, New Delhi.

At ASCI, with which he was associated for the last eight years, Dr Indradev conducted training, research and consultancy in the management of R&D institutions.

A member of the American Physical Society and founder honorary general secretary of the Society of R&D Managers of India, Dr Indradev has 11 publications in solid state physics and 10 in science policy and R&D management.

Shri Dilip M. Salwi of the Publications & Information Directorate, New Delhi, has been appointed on promotion Scientist B at CSIR Headquarters, New Delhi (15 Dec. 1981).

At the Structural Engineering Research Centre (SERC), Madras, promoted, consequent upon assessment, to the positions and with effect from dates mentioned in parenthesis are: Shri Zacharia George and Dr T.V.S.R. Appa Rao (Scientist EII, 6

Aug. 1981); Dr A.G. Madhava Rao (Scientist EII, 7 Aug. 1981); Dr B. Venkateswarlu (Scientist EII, 7 Sept. 1981); Dr M.N. Keshava Rao (Scientist EII, 11 Sept. 1981); Shri V.S. Parameswaran (Scientist EII, 16 Nov. 1981); Dr P. Srinivasulu (Scientist EI, 8 July 1981); Shri A.C.R. Djugash (Scientist C, 22 April 1981); and Shri K. Sukumar (Scientist A1, 23 Sept. 1981).

Appointments, on promotion, as Scientist B include those of Shri K. Ravikumar (5 Aug. 1981) and Shri V.

Shanmugam and Shri S. Annamalai (26 Aug. 1981).

Also at SERC-Madras, Shri K. Narasimhan has been appointed Scientist B1 (29 May 1981) and Shri Abiram Gopinath, Scientist B (20 Jan. 1982).

Shri H.B. Jayaraman, Shri A.S. Prasada Rao, and Shri G.V.S. Kumar have joined SERC-Madras as Scientist C; Shri M. Arumugam has joined as Scientist B on transfer from SERC-Roorkee. □

फार्म 4/FORM IV

[नियम 8 देखिए/(See Rule 8)]

1 प्रकाशन स्थान/ Place of publication	New Delhi
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पता/Address	As above in (3)
6 उन व्यक्तियों के नाम व पते जो समाचार-पत्र के स्वामी हो तथा जो समस्त पूंजी के एक प्रतिशत से अधिक के संप्रदाय या हिस्सेदार हो। Names and addresses of individuals who own the newspaper and partners or share holders holding more than one per cent of the total capital.	
मैं, _____, एतद्वारा घोषित करता हूँ कि मेरी अधिकतम जानकारी एवं विश्वास के अनुसार ऊपर दिए गए विवरण सत्य हैं। I, Y.R. Chadha hereby declare that the particulars given above are true to the best of my knowledge and belief.	
सद/-Y.R. Chadha	
ता०/Dated 15 March 1982	
प्रकाशक के हस्ताक्षर/Signature of Publisher	



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

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NPL Merit Awards for 1981

Four teams of scientists have received the 1981 merit awards of the National Physical Laboratory (NPL), New Delhi. The awardwinning pieces of work are: (1) Development of hot journal box detection system for railways; (2) Development and establishment of national standards and calibration facilities for temperature measurements and evaluation of thermal properties of materials; (3) Development and establishment of vacuum standards and related techniques for generation and measurement of high vacuum; and (4) Participation in the Indian expedition to Antarctica.

The compositions of teams and brief descriptions of their works:

Hot journal box detection system

Dr S.P. Varma, Shri S.P. Suri, Shri Joginder Singh, Shri H.K. Maini, Dr S.K. Sarkar, Dr V.V. Shah, and Shri Kanji Lal

The problem of remote detection of an overheated journal box in a running train at a speed of 160 km/hr was posed to the laboratory. Intense vibrations near the running train-track side, low infrared energy emitted by an overheated journal box, high speed of the train, perfect operation of the system in adverse weather and climatic conditions, automatic operation of the system without involving personal attention, and rigid requirement of foolproof performance of the system without any false signal in the presence of hostile electrical interferences, all these factors made the problem difficult and challenging. Through a multidisciplinary approach the laboratory has

developed a fast, free-from-microphonics, rugged, sensitive and room-temperature infrared sensor; an optical system with suitable anti-reflection coating; a low-noise, low-ripple sensor-bias supply, and high-performance signal-processing electronics and digital display locator.

The entire work was carried out under the supervision and guidance of Dr V.G. Bhide.

The team has developed a prototype and has also field-tested it successfully. The production of this system has been taken up by the Central Electronics Ltd under the sponsorship of the Department of Science and Technology. [see also *CN*, 31 (1981), 129]

Temperature measurements and evaluation of thermal properties of materials

Shri K.D. Baveja, Shri V.P. Wasan, Shri R.S. Khandekar, Shri K.N. Bhatnagar, Shri Ram Krishan, and Shri N.K. Srivastava

The team has developed and established national standards and calibration facilities for temperature measurements. The work involved the setting up of several thermalequilibrium states, i.e. fixed points on the International Practical Temperature Scale such as gold point, silver point, zinc point, tin point, and triple point of water with accuracies comparable to those of international standards. Optical pyrometer, thermocouples and platinum resistance thermometers used as reference standards designed and fabricated at NPL cover the temperature range from 1800°C down to -183°C. International intercomparison of thermocouples amongst count-

ries of the Asia Pacific region has been successfully carried out. Techniques for evaluation of the thermal properties of materials and refrigerating appliances have also been established. These calibration and evaluation facilities are extensively utilized by government departments, and public and private sector undertakings and industries.

Vacuum standards and related techniques

Shri A.C. Gupta, Shri Desh Raj Sharma, Shri D.C. Sharma, Dr B.R. Chakraborty, Shri Pradeep Mohan, Shri P.K. Dutta, and Dr J.K.N. Sharma

The team has set up reference manometers and bakeable McLeod gauges, and calibration facilities for vacuum gauges and developed techniques for evaluation of leak detectors and vacuum pumps. The study of the noise of mechanical pumps has proved helpful in specifying internationally acceptable noise levels for the pumps. The fundamental study of molecular flow inside a test dome, carried out by this team, has given a deeper insight into the effects of gauge tube on pressure measurements. Gauges and vacuum controller for process control, developed by this team, are now being commercially manufactured.

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The team has also designed and developed a completely automatic vacuum system with various interlock and safety devices for the scanning electron microscope, developed in a multi-institutional project. Techniques for the production of a ultra-high vacuum with indigenous components have been developed. These will be useful in the future models of SEM.

The team has also successfully developed silver-impregnated graphite contacts under vacuum which are extensively used by Indian Railways. The commercial production of these components has resulted in considerable savings of foreign exchange; it has also substantial export potential.

Indian expedition to Antarctica

Dr Amitabha Sengupta

The sole representative of NPL in the Indian scientific team which landed on Antarctica on 9 January 1982, Dr Sengupta has also contributed in the past to the development of time and frequency programme. During the scientific mission to Antarctica, he had the primary responsibility of undertaking experiments in radio communication under difficult and often adverse conditions. He undertook experiments on a wide variety of radio communication studies all along the cruise path and at and near Antarctica; the experiments included measurements of time delay of standard frequency transmissions, of field strengths at a wide variety of frequencies, and omega transmissions at very low frequencies.

* * *

Krishnan Memorial Lecture: 1981

The 1981 Dr K.S. Krishnan Memorial Lecture was delivered by Dr R. Ramanna, Director, Bhabha Atomic Research Centre, Bombay, and Secretary to the Government of India, at the National Physical Laboratory, New Delhi, on 21 January 1982. 'On some recent advances in nuclear physics' was the topic of the lecture.

Dr Ramanna gave away the 1981 NPL merit awards to four teams of scientists. □

RRL-Hyderabad and Pharmaceutical Industries' Get-together

With a view to establishing closer links with the local pharmaceutical industry, the Regional Research Laboratory (RRL), Hyderabad, organized a get-together on 9 February 1982 in which fourteen industrialists, including representatives from IDL Chemicals and Indian Drugs and Pharmaceuticals Ltd, participated. Government departments dealing with industry, especially the chemical and drug industries, were also represented.

Briefing the participants on the laboratory's activities, Dr G. Thyagarajan, RRL's Director, said in his welcome address that among the recent successes was the development of a new non-steroidal, anti-inflammatory and anti-rheumatic drug, enfenamic acid, being marketed by Unichem Laboratories, Bombay, under the commercial name Tromaril. He attributed the success of the new drug to the sustained zeal, enthusiasm and confidence reposed in the laboratory by the firm, who also substantially funded its development. The drug was gaining wide acceptance in clinical practice, he added.

Shri P. Vanamali, Additional Director of Industries, informed the gathering that during the Sixth Plan 26,000 units in addition to as many existing units were proposed to be set up in Andhra Pradesh. RRL-Hyderabad could play an important role in providing new ideas that would help technocrats set up new units, he said.

There was tremendous potential for the pharmaceutical industry, according to Shri C. Gopalakrishna Murthy, Director, Drugs Controlling Authority, who said that at the end of the Sixth Plan, investment in the manufacture of basic drugs would touch Rs 7000 million and that in formulations, Rs 20,000 million.

Dr G.S. Rao and Dr Sajid Husain of RRL highlighted the facilities available in their laboratory.

Dr P.B. Sattur, head of RRL's Medicinal Chemistry Division, outlined the expertise available in his laboratory to assist the drugs and pharmaceuticals industry. As examples he cited Methaqualone, Diazepam, Chlordiazepoxide and Clofibrate, which were all being commercially produced. The assessment of drug requirements on a national level also was an activity of the laboratory; its in-house R&D work was in the areas of CNS depressants, anti-inflammatory, analgesic, anti-spasmodic and related compounds. Many promising molecules were at different stages of screening, Dr Sattur added.

More important of the suggestions/recommendations that emerged from the deliberations of the get-together:

- * A central testing laboratory should be set up in the vicinity of the industrial units. It should also have facilities for the training of personnel, analysis, preparation of feasibility reports, etc.

- * A consultancy cell should be constituted at RRL-Hyderabad to study the needs of the drug industry and to offer suggestions at personal levels.

- * To make an industrial unit economically viable, new ideas should be generated for diversification and product improvement. The Industries Department would provide funds for any facility useful to the industry.

- * A multi-product strategy similar to the one successfully adopted at RRL-Hyderabad for their pesticides chain should be attempted by all units to vie with the competitive market.

- * RRL-Hyderabad would assist the industry in patent search and in finding suitable keywords for retrieving information from computerized *Chemical Abstracts*.

- * The facilities at the Industrial Testing & Development Laboratory, Hyderabad, should be strengthened to cater to the needs of the industry. □

Statistical Software Packages

NISTADS-UNESCO WORKSHOP

The National Institute of Science, Technology and Development Studies (NISTADS), New Delhi, is cooperating with Unesco on the project 'International Comparative Study on the Organization and Performance of Research Units' (ICSOPRU)—a project in which, besides India, five countries, viz. USSR, Argentina, South Korea, Egypt and Poland, are participating. Within the framework of this project a workshop was organized, in collaboration with Unesco, on Special Statistical Software Packages at CSIR Complex, New Delhi, on 7-19 December 1981. Some 25 participants from NISTADS, CSIR Headquarters, Indian National Scientific Documentation Centre, Planning Commission and Electronics Commission, and two scientists, one each from Argentina and USSR, took part. The main objective of the workshop was to familiarize the participants with a few statistical computer programmes such as SPSS, SYSTIT and MLIFO4 which have been experimented upon by the Science and Technology Policies Division of Unesco.

The workshop was conducted by Ms Teresa Falborska, Unesco Consultant, with the assistance of Shri S.P. Gupta of NISTADS. □

Methods and Techniques in Exploration Geophysics

Unesco regional training course

On behalf of Unesco the National Geophysical Research Institute (NGRI), Hyderabad, organized a six-week training course from 4 November 1981 on 'Methods and Techniques in Exploration Geophysics' for in-service personnel.

Participants to this course—fourth in the series—were drawn, besides India, from five developing countries, viz. Sri Lanka, Iran, Afghanistan, Indonesia, and Nigeria. The course comprised theory lectures, practicals, and field

training, including acquisition of data using various geophysical instruments. The participants were also trained in the methods of surveying, laying of traverses for taking geophysical measurements, and systematic compilation, processing and interpretation of integrated geophysical data.

The visit to a field camp at Kalva (Cuddapah Basin), Kurnool dist., exposed the participants to the exploration work being carried out by the Geological Survey of India (GSI) for base metals. Visits were also arranged to earth science organizations like the Centre for Exploration Geophysics of the Osmania University, GSI, and National Remote Sensing Agency. □

Low-chromate and non-chromate corrosion inhibitors

The Central Electrochemical Research Institute (CECRI), Karaikudi, has developed processes for the production of low-chromate and non-chromate corrosion inhibitors for preventing corrosion of steel in heat exchangers/condensers. On the basis of recirculating water requirements in petroleum refineries, thermal power plants, and alcohol, aluminium, steel and copper industries the demand for these inhibitors is estimated to be of the order of crores of rupees.

The CECRI processes consist of blending together three ingredients in the case of the low-chromate corrosion inhibitive powder and four in the case of the non-chromate corrosion inhibitor.

Capital investment for a plant capable of producing one tonne of non-chromate corrosion inhibitor has been estimated at Rs 17.34 lakh, and the cost of production at about Rs 21,350 per tonne, the return on investment being 63%.

In the case of the low-chromate corrosion inhibitive powder, capital investment for a plant of one tonne per day capacity has been estimated at Rs 4.32 lakh, cost of production at

about Rs 4900 per tonne, and return on investment, 76%. □

PROGRESS REPORTS

SERC Annual Report: 1980-81

The annual report of the Structural Engineering Research Centre (SERC), Madras, for the year 1980-81, shows that the R&D projects being pursued at the laboratory were related mainly to low-cost housing, modular concrete products, precast and *in-situ* concrete construction, polymer concrete composites, underground and submerged structures, failure of structures, optimization of tower, truss and frame structures, and computer-aided designing.

The construction of 80 units of three-dimensional ferrocement service core units by the Tamil Nadu Housing Board at one of their 'sites and services schemes' was completed. Studies relating to the structural behaviour and thermal comfort of the 23 houses built at Madras in 1977 in connection with the International Seminar and Exhibition on Low Cost Housing were also completed and a report was under preparation.

The development of reinforced splices for tension and compression was continued. Tests on one set of splices based on partial overlap were completed. Moveable forms were fabricated based on the designs developed earlier for the *in-situ* construction of concrete portals.

Studies on the structural behaviour of polymer-impregnated ferrocement slabs were completed. Three-edge-bearing tests and hydrostatic pressure tests were conducted on pipes made of polymer-impregnated ferrocement. Comparative studies were also made on unimpregnated ferrocement pipes.

A new jointing system and a space-grid roofing scheme were developed and efforts were being made to bring out a design handbook on space-grid roofing systems.

The computer programs developed for the analysis and design of fink

trusses, single-bay portals, and gable frames were extended to include multi-bay configurations.

In the area of cable-supported structures, a parametric study considering the effects of cable and mast stiffnesses on the buckling load of a three-level guyed tower was continued. A formulation of the stability problem including torsional and flexural buckling aspects was tested with bench mark examples.

Under the project concerning non-linear elastic/inelastic analysis of framed

structures, a numerical model was developed to simulate the inelastic behaviour of a reinforced concrete member.

The centre continued to provide consultancy services to public and private sector organizations. Thirteen projects were taken up and completed. Two sponsored projects taken up last year were also completed and one new project on 'Z purlins' was taken up during the year.

Ten papers were published, and nine presented in various symposia; three patents were filed. □

GENETICS OF GENE EXPRESSION

Bhatnagar Prizewinner Dr Sushil Kumar's Work

Engaged in uncovering the genetic control mechanisms, Dr Sushil Kumar has contributed significantly towards the understanding of gene expression in the bacterium *Escherichia coli*. Between 1968 and 1970, Kumar in collaboration with Wacław Szybalski identified the internal transcription termination sites in two operons of *E. coli* temperate phage lambda and revealed the anti-termination effect that *N* gene product has at these sites. Along with E. Calef, they showed that *tof* gene product of lambda is a repressor of the *cl*-repressor required for maintenance of lysogeny. His work with lambda *dv* gave the concept that host genes regulate the expressions of lambda genes. His recent work, for which he has won the 1981 Shanti Swarup Bhatnagar Prize, has been responsible for the concept that in *E. coli*, the dispensable cyclic adenosine-3',5'-monophosphate-receptor protein complex determines adaptation in bacteria by controlling the structure of cell wall. This work has opened new ground and has formed the basis of a number of other investigations. A perspective of this prizewinning work:

The current work on the cellular functions of cAMP is traceable to an original observation made by J. Monod in 1947. Monod found that the presence



of glucose in the growth medium of *E. coli* causes a severe inhibition on the catabolism of other sugars such as maltose, ribose, xylose, rhamnose, lactose, and arabinose—a phenomenon known as catabolite repression. In 1965 Makman and Sutherland discovered that glucose-grown bacteria carry little cAMP and thus provided a chemical meaning to the observation of Monod. The first adenyl cyclase-deficient mutant (*cya*) was isolated by Perlman and Pastan in 1968. They noted its inability to catabolize a variety of carbohydrates other than glucose. This work led to the demonstration that cAMP-receptor protein complex is required for initiation of transcription of a number of operons in *E. coli* that are sensitive to

catabolite repression by glucose. However, a number of questions about catabolite repression and role(s) of cAMP remained unanswered. In 1976 Kumar discovered a number of new properties of *cya* and *crp* (deficient in cAMP receptor protein) mutants which form the basis of much of current work in this field. He showed that: (i) as compared to the wild type, the mutant bacteria are resistant to injury by sublethal osmotic shock and elevated temperature stresses, ionizing and ultraviolet radiations, chemical antimicrobials and phages lambda, T6 and others; (ii) they are sensitive to neutral detergents and sodium azide; (iii) their growth rate is slower; (iv) they propagate as cocci or coccobacilli and therefore have smaller surface/volume ratio; (v) the minicell-producing ability remains suppressed in them; and (vi) whereas the *cya* cells grown with $5 \times 10^{-4} M$ to $10^{-3} M$ cAMP supplementation are indistinguishable from the wild type cells in the above properties, those grown with $2 \times 10^{-4} M$ or less supplementation are cocci and short to long rods demonstrating from only partial to full acquirement of wild type phenotype in the various components of pleiotropy. This work demonstrated that the structures of the three layers of the cell wall of mutants depend on the concentration of cAMP. Later work from his laboratory, on the parameters of partially cAMP supplemented *cya* cells and *ftsA cya* cells that do not grow, has shown that in the wild type *E. coli* cells the envelope growth components are synthesized and assembled by the interaction of two kinds of systems: (i) a dispensable and cAMP-governed horizontal envelope-growth process makes lateral walls; and (ii) an essential but cAMP-independent hemispherical envelope-growth process makes cross walls. He also showed that the wild type cell's capability to adjust to its environment is determined by the composition of its lateral walls.

Sushil Kumar (born 14 Dec. 1940, New Delhi) obtained his B.Sc. (Hons)

Dr Sushil Kumar of the Indian Agricultural Research Institute, New Delhi, has been chosen for the 1981 Shanti Swarup Bhatnagar Prize in biological sciences (along with Dr P.V. Sane of the Bhabha Atomic Research Centre, Bombay) [CN 31 (1981), 177].

degree from the University of Delhi, and M.Sc. (1960) and Ph.D. (1965) degrees in genetics from the Indian Agricultural Research Institute (IARI), New Delhi.

Proceeding to USA in 1966, as a postdoctoral fellow with Dr Paul Margolin at the Cold Spring Harbor Laboratory, New York, Dr Kumar investigated the organization of tryptophan operon in *Salmonella typhimurium*. From 1968 to 1971 he worked on phage lambda at the University of Wisconsin, Madison, and the University of Toronto. While at Madison, Kumar in collaboration with Dr Wacław Szybalski revealed the roles of *N* and *toF* genes of phage lambda. This work for the first time showed that the host genes are required for the expression of lambda genes.

Returning to IARI in December 1971, he has been holding the present position at the Genetics Division since then. During the earlier years, he investigated the function of cyclic 3',5'-adenosine monophosphate (cAMP) in *E. coli*—a work that has been responsible for the origin and development of the concept that the cAMP-receptor protein complex determines the organism's adaptability by controlling the structure of cell wall. In recent years, while continuing his studies on *E. coli* and its phages and plasmids, he has concentrated on the genetical analysis of symbiosis between *Rhizobia* and legumes.

Dr Kumar is a fellow of the Indian Academy of Sciences, and a life member of the Indian Society of Genetics and Plant Breeding, Indian Society of Cell Biology, Society of Plant Physiology and Biochemistry, and Association of Microbiologists of India. He has published 39 research papers. □

EXTRAMURAL RESEARCH

Fertile and infertile human semen

Physiological and biochemical studies on fertile and infertile cases of human semen have been carried out by Dr A.

Manjula, a postdoctoral CSIR research fellow, at the Department of Zoology, Bangalore University, Bangalore. The semen samples were grouped into normospermic, oligospermic, and azospermic categories, depending on the sperm count and the motility of the sperms. The age of the patients, volume of semen, sperm count, and percentage of motile spermatozoa varied in all the groups.

The hexosamine sugars (galactosamine and glucosamine) present in the oligospermic samples showed a decrease when compared with the normospermic cases, and a further decrease in the azospermic samples was noticed. The amount of DNA also showed a decrease in the oligospermic and azospermic semen. The very small amount of DNA present in the azospermic samples may be contributed by the spermiocytogenetic cells. DNA was completely absent from the patients who had undergone vasectomy. But the protein content did not vary much in the three groups.

Preliminary studies on the ultrastructure of the human spermatozoa of the oligospermic group showed some of the abnormalities like absence of acrosome, presence of vacuoles in the nucleus of the spermatozoa, and other commonly found abnormalities.

A detailed morphological and biochemical analysis of the semen would be necessary, according to the researcher, before a final analysis of fertility is made in clinical diagnosis of the male. □

PERSONNEL NEWS

Prof. M.M. Taqui Khan appointed CSMCRI Director

Prof. M.M. Taqui Khan, Head of the Chemistry Department of the Osmania University, Hyderabad, has been appointed Director, Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar (1 March 1982).

Following his brilliant undergraduate and graduate education in the Madras

and Osmania universities respectively, Prof. Khan completed his doctoral work in the Clark University, Worcester, Mass. (USA) under Prof. A.E. Martell. Entering service in Osmania University in 1952, Prof. Khan



was associated with this university in various capacities: lecturer, professor, principal of a constituent college (Nizam College), and head of the Chemistry Department till the end of February 1982. During 1968-70 he was Associate Professor at the Indian Institute of Technology, Madras. A visiting professor at Texas 'A' & 'M' University, Texas, USA, since 1972, Dr Khan was UGC's national lecturer in chemistry in 1979-80.

Prof. Khan's research interests are in inorganic and coordination chemistry. He has about 100 research papers, and about a dozen students, working with him both at IIT-Madras and Osmania University, have earned their Ph.D. degree. Author of two monographs on 'Homogeneous Catalysis by Metal Complexes' (Academic Press, New York, 1974), he has presented papers and chaired many sessions in several international conferences on coordination chemistry. At the 22nd International Conference on Coordination Chemistry to be held at Budapest, Hungary, in August 1982, he has been invited to give a plenary lecture.

Prof. Khan has held memberships of research advisory committees of several CSIR laboratories, of UGC's panel in chemistry (1978-81), and of CSIR's Chemical Research Committee and Catalysis Research Committee (1973-

81). He is a member of the board of the Banaras Hindu University, of the Gandhigram Rural Institute, Gandhigram, Madurai, and of the board of governors of the Regional Engineering College, Warangal.

Among the learned and professional societies' honours which Prof. Khan holds are membership of the Indian Chemical Society, fellowship of the Royal Institute of Chemistry, membership of the Chapter of Sigma Xi, and fellowship of the National Academy of Sciences and of the Indian National Science Academy. □

Dr K.S. Rajagopalan appointed CECRI Director

Dr K.S. Rajagopalan of the Central Electrochemical Research Institute (CECRI), Karaikudi, who was heading



this institute as Acting Director, has been appointed Director (5 Jan. 1982).

For a brief profile of Dr Rajagopalan's career and scientific achievement, see *CN*, 31 (1981), 175. □

Appointments/Promotions

The promotions of Dr L.M. Pant and Dr (Kum.) S.B. Kulkarni of the National Chemical Laboratory (NCL), Pune, to the position Scientist EII have been announced [*CN*, 32 (1982), 15]. Brief biographical profiles of the scientists:

Dr L.M. Pant

Dr Pant (born 19 Aug. 1928) obtained his M.Sc. degree in physics from the Allahabad University in 1947 and Ph.D. degree in crystallography, under the guidance of late Prof. Kathleen Lonsdale, FRS, from the University of London in 1958.

With NCL since 1959, Dr Pant has established a research group working mainly on crystal imperfections, theoretical crystallography and structural studies of organic compounds. In 1964 he worked in the University of Paris (Orsay) for nine months on crystal imperfections.

Dr Pant was a member of the national committee for crystallography from 1968 to 1974. Has published more than 45 papers on crystallography and crystal physics, and guided five students for Ph.D. degree.

Dr. (Kum.) S.B. Kulkarni

Dr Kulkarni obtained her Ph.D. degree from the Indian Institute of Science, Bangalore, in 1950. Joining NCL the same year, she has been engaged in basic research in surface chemistry and also in the development of *n*-long chain compounds from cottonseed oil for the control of water evaporation. The usefulness of the monomolecular films of *n*-long chain alkoxy ethanols for water conservation has been established in various lakes and water reservoirs in the semi-arid regions of Maharashtra through field trials carried out in collaboration with the Irrigation Department of Maharashtra government.

A specialist in heterogeneous catalysis, she has carried out extensive work on synthesis, physico-chemical characterization and catalytic reactions of synthetic zeolites. She has developed processes for the manufacture of molecular sieve zeolites of types A, X, and Y and high-silica zeolites of type ZSM-5. Based on the high-silica zeolites, NCL has developed catalysts and processes for alkylation, isomerization, etc.

Dr Kulkarni was deputed to UK under the Colombo Plan and to USA under the CSIR-NSF scientists' exchange programme. She is a member of the Royal Institute of Chemistry, London, and Catalysis Society of India, and Thermal Analysis Society of India. Has over 70 papers to her credit. □

Dr R.N. Athavale

Dr R.N. Athavale of the National Geophysical Research Institute (NGRI), Hyderabad, has been promoted as Scientist EII (12 Jan. 1982).

Dr Athavale (born 26 July 1938) obtained M.Sc. in geology and Ph.D. in geophysics in 1959 and 1970 respectively. Before joining NGRI, Dr Athavale worked at the Tata Institute of Fundamental Research, Bombay, from 1959 to 1966. Dr Athavale's research interests are in geomagnetism and geohydrology. He has several contributions to his credit in palaeomagnetism of rocks from India and Greenland, archaeomagnetic studies of pottery samples of Egypt and India, continental drift and plate tectonics, Himalayan orogeny, and the Koyna earthquake. In geohydrology, his researches encompass the use of radioactive tracers (both environmental and artificial), geophysical exploration of groundwater, and hydrogeological investigations in different parts of the country.

A fellow of Indian Geophysical Union, Association of Exploration Geophysicists, Geological Society of India, Association of Hydrologists, and Maharashtra Academy of Sciences, Dr Athavale has 58 papers/reports to his credit. □

* * *

At the Publications & Information Directorate, New Delhi, promotions, consequent assessment, include those of Shri G.N. Sarma (as Scientist B, 23 Oct. 1980), Shri S. Hirannaiah (as Scientist B, 9 Nov. 1980), Shri H.K. Khanna (as Scientist B, 30 Nov. 1980), Shri M.M.S. Karki (as Scientist B, 14 Dec. 1980), Shri A.K. Gupta (as Scientist B, 6 Jan. 1981), Shri D.S. Verma (as Art Officer B, 1 Aug. 1980), Dr B.S. Aggarwal (as Scientist A, 18 Dec. 1980), Dr N.R. Mankad (as Scientist A, 1 Jan. 1981), Dr Chander Shekhar (as Scientist A, 3 Jan. 1981), Shri V.S. Chaturvedi (as Production Officer A, 20 June 1980), Shri R.D. Joshi

(as Production Officer A, 21 Aug. 1980) and Shri D.N. Srivastava (as Production Officer A, 2 Sep. 1980).

Honours & Awards

Schroff Memorial Award to Dr Nityanand

In recognition of his contributions to the pharmaceutical sciences and the pharmacy profession, Dr Nityanand, Director, Central Drug Research Institute, Lucknow, has been conferred the Schroff Memorial Award, for 1981, of the Indian Hospital Pharmacists' Association. He was presented with a citation and a memento at the 33rd session of the Indian Pharmaceutical Congress held at Jaipur on 20 December 1981.



Dr Nityanand, the citation says, has distinguished himself as a top-ranking pharmaceutical scientist, has promoted drug research and discovered several new drugs, has chaired the Indian Pharmacopoeia Committee, has given his wise counsel to governmental and private bodies on matters pertaining to drugs, and has endeared himself to all through his gentleness, humility and modesty.

Dr Nityanand has been largely responsible for establishment of an active school of medicinal chemistry at CDRI, which has contributed significantly to the development of new biodynamic agents, particularly in fertility regulation and tropical diseases. Amongst the more notable of his contributions are the developments of an anti-thyroid drug, a local anaesthetic, a post-coital oral contraceptive, an antifilarial agent, and a major tranquilizer, which are in advanced stages of clinical trials. He is playing an

important role in promoting the integration of the traditional systems of medicine with modern medicine through scientific evaluation of indigenous remedies and medicinal plants. His contributions in fundamental research include the elucidation of receptor mechanisms, of the metabolism and mode of action of drugs, and evolving new synthetic methods for heterocyclic compounds. He has published about 230 research papers and 10 review articles. □

PATENTS INFORMATION

Indian Pat. 149249

(Application No. 165/Del/78)

An improved apparatus for the simultaneous determination of carbon, hydrogen, and halogen or sulphur in organic matter, coke, coal, steel, and like materials.

R.B. Malvankar, S.S. Ramdasi and V.S. Pansare
National Chemical Laboratory, Pune 411 008

The invention relates to an improvement in the design of the apparatus for simultaneous and rapid determination of carbon, hydrogen, and halogen or sulphur. The improved design of the combustion tube in the apparatus makes it leakproof and is very convenient for introduction and withdrawal of the reagent which absorbs halogen or sulphur oxides. This results in the saving of time. Also, as the apparatus is designed for simultaneous determination of the elements, only small quantities of the samples are required. The improvement in the design of the apparatus does not add to its production cost.

* * *

Indian Pat. 149110

(Application No. 220/Del/77)

An improved casing pipe to facilitate water level measurements in shallow tubewells

S. Mallick

International Hydrological Programme Unit
(CSIR)

C/o Technology Bhavan, New Delhi 110016

The patent relates to an improved design of tubewell casing pipe wherein necessary facilities for measuring groundwater level in a shallow tubewell have been incorporated. The improvement in the design entails negligible

extra cost but facilitates necessary water level measurements both during the operation of the pump and when it is at rest.

Though 'shallow tubewells', because of their low cost in construction and maintenance, are most commonly used, they do not have any provision for direct groundwater level measurements. Aquifer performance tests by proper methods, e.g. by constructing separate observation wells, are seldom conducted in shallow aquifers which support a very large number of shallow tubewells. With the adaptation of the patented design the production wells would also serve as observation wells, and routine collection of hydrogeological data through these tubewells would help update the reserve calculation and water balance studies. Such tubewells are being constructed now in lakhs every year for bringing more and more land under irrigation. □

PATENTS FILED

628/Del/81: Improvements in or relating to lithium manganese dioxide nonaqueous button cells, R.I. Gangadharan, P.N.N. Namboodiri, K.V. Prasad, S. Muthukaruppan & H.V.K. Udupa—Central Electrochemical Research Institute, Karaikudi.

667/Del/81: A continuous process for the production of carnallite from sea or sub-soil bitterns by solar evaporation, Q.D. Bhat, M.R. Oza, J.R. Sanghavi & K.S. Rao—Central Salt & Marine Chemicals Research Institute, Bhavnagar.

668/Del/81: A process for the preparation of polyamides, N.D. Ghatge & U.P. Mulic—National Chemical Laboratory, Pune.

669/Del/81: A process for the preparation of precipitated calcium carbonate from carbide lime sludge, A. Suryanarayana, J.R. Rao, K. Parida & B.R. Sant—Regional Research Laboratory, Bhubaneswar.

703/Del/81: Improved process for the preparation of ethyl α -(carbethoxy)- β -(substituted anilino) acrylates, N.R.

Ayyangar, V.K. Jinaraj, R.J. Lahoti & T. Daniel—National Chemical Laboratory, Pune.

804/Del/81: Process for the synthesis of new 3,6-diaryl-3,4-dihydro-1,3,2-oxazaphosphorin-2-oxides, B.D. Tilak, V.N. Gogte & A.S. Modak—National Chemical Laboratory, Pune.

ANNOUNCEMENTS

Workshop on Longwall Mining

The Central Mining Research Station (CMRS), Dhanbad, is organizing a two-day workshop on Longwall Mining on 29-30 April 1982. The workshop will cover: (i) planning of longwall face including choice of locales, equipment and supports, (ii) immediate past experience of longwall caving in India for identification of constraints and remedies to overcome them, (iii) infrastructure facilities and role of different organizations including manufacturers, and (iv) implementation of the future longwall programme in different coal companies.

Further details may be obtained from the Director, or Dr S.K. Sarkar, coordinator of the workshop, Central Mining Research Station, Dhanbad, on or before 7 April 1982. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Advertisement No. 12 82

The Council proposes to appoint Director for the National Geophysical Research Institute, Hyderabad. The institute is engaged in applied and basic research in geophysics and related disciplines in earth sciences.

The prospective Director should have high academic qualifications, an established reputation of excellence in research and development, and management capability of high order. The qualifications should be in geophysics, physics or geology with specialization and research experience in any branch of earth sciences. He should be able to enthuse younger colleagues and establish close relationship with government and private agencies dealing with earth sciences.

Advertisement No. 13/82

The Council proposes to appoint Director for the Central Fuel Research Institute, Dhanbad.

This institute is devoted to research and development work in coal science and technology. The major areas of work are: (i) quality assessment of coal resources of the country, (ii) technologies of its preparation, combustion and conversion, (iii) utilization of byproducts of coal-conversion industries, (iv) related basic sciences like coal geology, geochemistry, coal constitution, catalysts and catalysis, besides studies on energetics and the planning and promoting of coal-based industrial complexes.

The Director is expected to provide a high-level leadership in formulating and prosecution of the R&D programmes and projects in these areas and interact with users of research results effectively for gainful application of the efforts of the institute for furthering the interests of the national coal-producing and -consuming industry. He should have the ability to establish good rapport with academic and professional institutions and governmental planning authorities dealing with fuel utilization.

High academic qualifications in chemistry, chemical engineering, fuel technology or mechanical engineering with proven ability and R&D experience in one or more areas of work of the institute and proven managerial experience.

Advertisement No. 14 82

The Council proposes to appoint Director for the Industrial Toxicology Research Centre (ITRC), Lucknow. ITRC is engaged in research and development in industrial and environmental toxicology, and the broad areas of work are epidemiological studies on the prevalence and nature of diseases due to exposure to toxic chemicals in industry and agriculture; safety evaluation of chemicals used in industry, agriculture and home; experimental studies on mode of action of environmental toxicants; development of diagnostic tests and preventive or remedial measures; environmental and biological monitoring of toxic chemicals; and dissemination of information on toxic chemicals.

Current research projects on industrial dyes, metals, pesticides, plastics, solvents and dust draw expertise from many disciplines belonging to biological, chemical and medical sciences. ITRC has an ambitious plan for expanding its activities to develop expertise in environmental carcinogenesis, immuno-, behavioural- and genotoxicology and to assess the impact of chemicals on diverse ecosystems.

The prospective Director should have high academic qualifications in any branch of biological or chemical or medical sciences. The incumbent should possess sound research experience in handling toxicological problems associated with chemicals and industrial products. He is expected to provide a high-level leadership in furthering the multi-disciplinary research objectives of the centre and project its image in national and international bodies.

Common to all the three positions

The scale of pay is Rs 2500-125/2-3000 plus allowances as per the Central Government rules. Higher initial pay can also be considered. Consultancy earnings subject to an upper limit of Rs 15,000 per annum are permitted. Free medical aid and leave travel concession are also permissible for the family. Residential accommodation in campus is available on payment of rent.

Age should be preferably below 50 years, relaxable in deserving cases.

These are contractual appointments initially for a period of six years. The contract is extendable and the incumbents can also be confirmed.

Those interested may send their *curriculum vitae* in the prescribed form to the Chief (Administration), Council of Scientific & Industrial Research, Rafi Marg, New Delhi 110001.

The deadline for receipt at CSIR Headquarters of *curriculum vitae* in prescribed form in the case of the first two positions is 27 April 1982, and in the case of the third is 5 May 1982. Literature on the institutes will be made available on request. □

* * *

The Council of Scientific & Industrial Research proposes to appoint Scientists F in its various constituent laboratories. The respective discipline/area and the CSIR constituent laboratory as also the deadline for sending *curriculum vitae* are as follows:

Advt. No. 8/82: Materials Science Division, National Aeronautical Laboratory, Bangalore—13 April 1982.

Advt. No. 9/82: Agronomy/genetics and plant breeding, Central Institute of Medicinal & Aromatic Plants, Lucknow—12 April 1982.

Advt. No. 10/82: Planning and coordinating projects within and outside CSIR, CSIR Headquarters, New Delhi—12 April 1982.

Advt. No. 11/82: Civil Engineering Consultancy Services—29 April 1982.

Advt. No. 15/82 (Three posts): (i) Internal combustion engineering, (ii) Chemical engineering/petroleum technology, and (iii) Technoeconomic feasibility studies relating to refining, and petroleum chemicals, Indian Institute of Petroleum, Dehra Dun—5 May 1982.

Advt. No. 16/82: (Two posts) (i) Theoretical geophysics and (ii) Deep seismic sounding, National Geophysical Research Institute, Hyderabad—13 May 1982.

The pay scale for these posts is Rs 2000-125/2-2500 plus allowances at the Central Government rates. Higher initial pay may be considered. Prescribed forms for sending the *curriculum vitae* are obtainable from the Chief (Administration), Council of Scientific & Industrial Research, New Delhi 110001, from whom further details regarding the above posts may also be obtained. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN

VOL 32 NO 7 15 APRIL 1982

Shanti Swarup Bhatnagar Prizes for 1981 Presented

Nine distinguished scientists received the 1981 Shanti Swarup Bhatnagar Prizes for Science and Technology from the CSIR's Vice President, Prof. S. Nurul Hasan, at a function held at the National Physical Laboratory, New Delhi, on 31 March 1982. Each winner received Rs 20,000, citation and a scroll.

Congratulating the awardwinners the CSIR's Vice President said that the country needed scientific and technological efforts of the highest order to help achieve self-reliance. Without such efforts we cannot hope to change the quality of life of the masses of our people, he added. The successful achievements in space research and the expedition to Antarctica provided the evidence of remarkable capabilities of

our scientists. It was necessary that they be provided with the appropriate opportunities. "CSIR proposes to provide these opportunities in many fields. We hope to set up a new Institute of Microbial Technology and, strengthen, under the supervision of the National Biotechnology Board, research effort in frontier areas of biology and bio-engineering", Prof. Hasan informed. He further said that in consultation with the Electronics Commission the Council proposed to improve the competence in the field of electronics. The newly established Department of Ocean Development had entrusted to CSIR the responsibility of stepping up research in the field. The Council proposed to strengthen re-

search in various aspects of physical, chemical and biological sciences. So would the linkages with industry—in the public as well as private sector. CSIR was also expected to make adequate contribution in the development of information sciences. Prof. Hasan expressed his happiness over the establishment of the National Institute for Science, Technology and Development Studies, which would help guide our science policy and monitor the social consequences of progress in science and technology.

Referring to the working and living conditions of the scientists, Prof. Hasan said that efforts were being made to provide greater facilities for research and to improve the scientific environment of the country.

Prof. Hasan was happy that Indian scientists living abroad had responded readily to the call to serve their motherland and that many schemes were being implemented to utilize their services more fruitfully.

Noting that none of the awards this year had gone to any university, the CSIR's Vice President called for strengthening the university sector so that it could also make full contribution to the scientific efforts of the nation.



Prof. S. Nurul Hasan, CSIR's Vice President, addressing the gathering on the occasion of presenting Shanti Swarup Bhatnagar Prizes. Seated on the dais are (from left) Dr G.S. Sidhu, Director General, CSIR, and Dr A.R. Verma, the then Director of NPL

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Dr G.S. Sidhu, Director General, CSIR, read out the citations, which are reproduced below:

CITATIONS

Dr S.M. Roy

The Shanti Swarup Bhatnagar Prize for the year 1981 in physical sciences has been awarded to Dr S.M. Roy, Tata Institute of Fundamental Research, Bombay, along with Prof. R. Srinivasan, Indian Institute of Science, Bangalore.

Dr Roy has made outstanding contributions to the study of pion dynamics and high-energy hadron interactions. His work on pion-pion dynamics that led to an integral equation, now known as Roy's equation, has revolutionized the subject and is fundamental to all subsequent work in the field. Dr Roy's works on high-energy theorems and violations of Pomeranchuk theorem are also important contributions. [For a detailed account of Dr Roy's prizewinning work see *CN*, 32 (1982), 18.]

Prof. R. Srinivasan

The Shanti Swarup Bhatnagar Prize for the year 1981 in physical sciences has been awarded to Prof. R. Srinivasan, Indian Institute of Science, Bangalore, along with Dr S.M. Roy, Tata Institute of Fundamental Research, Bombay.

Prof. Srinivasan has developed outstanding experimental techniques to study magnetic resonance phenomena at high pressures and low temperatures. Using ESR, NMR and ENDOR techniques, he has established unequivocally the role played by hydrogen atoms and ammonium ions in ferroelectric systems. His contributions to the study of phase transitions and magnetic

interactions in solids are very significant. [For a detailed account of Prof. Srinivasan's prizewinning work see *CN*, 32 (1982), 19.]

Prof. D. Balasubramanian

The Shanti Swarup Bhatnagar Prize for the year 1981 in chemical sciences has been awarded to Prof. D. Balasubramanian, Centre for Cellular and Molecular Biology, Hyderabad, along with Prof. B.M. Deb, Indian Institute of Technology, Bombay.

Prof. Balasubramanian has made significant contributions to various aspects of biophysical chemistry. His major studies pertain to peptide conformation, ion-peptide bonding, water structure and hydrophobic interactions, biomembrane models, and photoregulation of membrane processes. He has effectively employed modern spectroscopic methods in solving problems of biological interest and his researches are characterized by their originality and interdisciplinary nature. [For a detailed account of Prof. Balasubramanian's prizewinning work see *CN*, 32 (1982), 38.]

Prof. B.M. Deb

The Shanti Swarup Bhatnagar Prize for the year 1981 in chemical sciences has been awarded to Prof. B.M. Deb, Indian Institute of Technology, Bombay, along with Prof. D. Balasubramanian, Centre for Cellular and Molecular Biology, Hyderabad.

Prof. Deb has made original and significant contributions in theoretical chemistry. He has developed a versatile model of molecular geometry highlighting the role of electronuclear attractive force and the highest occupied molecular orbital in determining molecular

shapes. He has also investigated the concept of internal stresses for studying molecules and solids and has related it to other fundamental approaches such as density-functional theory and quantum fluid dynamics. [For a detailed account of Prof. Deb's prizewinning work see *CN*, 32 (1982), 12.]

Prof. S.C. Dutta Roy

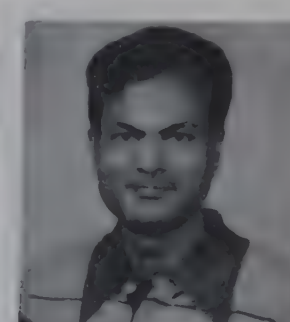
The Shanti Swarup Bhatnagar Prize for the year 1981 in engineering sciences has been awarded to Prof. S.C. Dutta Roy, Indian Institute of Technology, Delhi.

Prof. Dutta Roy has made outstanding contributions in the field of signal processing—digital as well as analog. His contributions to charge-coupled devices have important applications in a wide variety of industries. His other notable contributions include a simple and elegant method for sensitivity calculation in active and passive filters and a network synthetic approach to variable frequency oscillators. His work in the area of distributed RC networks is particularly well known because of its importance in analog integrated circuit. He has established an excellent school of research with a high degree of national and international recognition. [For a detailed account of Prof. Dutta Roy's prizewinning work see *CN*, 32 (1982), 10.]

Prof. J.K. Ghosh

The Shanti Swarup Bhatnagar Prize for the year 1981 in mathematical sciences has been awarded to Prof. J.K. Ghosh, Indian Statistical Institute, Calcutta.

Prof. Ghosh has made outstanding contributions to theoretical statistics in several directions. He has significantly extended the results



1981 Bhatnagar Prize-winners (from top left):

Dr S.M. Roy
Prof. R. Srinivasan
Prof. D. Balasubramanian
Prof. B.M. Deb
Prof. S.C. Dutta Roy
Prof. J.K. Ghosh
Dr P.V. Sane
Dr Sushil Kumar
Dr U.C. Chaturvedi

of Fisher and Rao on the second order efficiency of maximum likelihood estimators. Using refined analytical tools he has obtained highly useful results in the asymptotic expansion of the distribution of sample statistics. In the matter of applications of probabilistic methods, he has made an excellent contribution to the understanding of sediment transport in fluid flows through stochastic models. Earlier, he had proved under very general conditions that in reducing a problem through sufficiency and invariance, the order in which these criteria are applied is immaterial. [For a detailed account of Prof. Ghosh's prizewinning work see *CN*, 32 (1982), 13.]

Dr P.V. Sane

The Shanti Swarup Bhatnagar Prize for the year 1981 in biological sciences has been awarded to Dr P.V. Sane, Bhabha Atomic Research Centre, Bombay, along with Dr Sushil Kumar, Indian Agricultural Research Institute, New Delhi.

Dr Sane has made outstanding contributions in the area of structure and function of the cellular organelle chloroplast involved in photosynthesis. This has been achieved by proposing most likely locations of certain important enzymes in the thylakoid system. His suggestion of the role of proton translocating proteins in the chloroplast membranes has wide significance in the proton movement across the membrane. His studies on light emission from photosynthetic membranes have contributed to the understanding of energy storage during electron transport. [For a detailed account of Dr Sane's prizewinning work see *CN*, 32 (1982), 11.]

Dr Sushil Kumar

The Shanti Swarup Bhatnagar Prize for the year 1981 in biological sciences has been awarded to Dr Sushil Kumar, Indian Agricultural Research Institute, New Delhi, along with Dr P.V. Sane, Bhabha Atomic Research Centre, Bombay.

Dr Sushil Kumar has made outstanding contributions in the broad area of gene expression in *Escherichia coli* and its phage lambda. His principal contributions involve the demonstration for the first time that the dispensable cAMP-receptor protein complex determines adaptation in bacteria by controlling the structure of cell wall. His recent contribution on mutants of *Rhizobium* having high nitrogen fixing ability has far-reaching implications in agriculture. [For a detailed account of Dr Sushil Kumar's prizewinning work see *CN*, 32 (1982), 44.]

Dr U.C. Chaturvedi

The Shanti Swarup Bhatnagar Prize for the year 1981 in medical sciences has been awarded to Dr U.C. Chaturvedi, K.G.'s Medical College, Lucknow.

Dr Chaturvedi has made original contributions to our knowledge of the immune response to dengue virus infection. Starting with the epidemic

of dengue fever in Kanpur, Dr Chaturvedi extended his studies in the animal model and worked out the precise mechanism of immune suppression mediated by factors induced by dengue virus, thus opening up a new field of investigation using other virus models. These studies are valuable for a better understanding of dengue haemorrhagic fever and shock syndrome prevalent in several parts of South-East Asia. [For

a detailed account of Dr Chaturvedi's prizewinning work see *CN*, 32 (1982), 5.]

Later, the prizewinning scientists met the Prime Minister, and President of CSIR, Smt. Indira Gandhi, who could not attend the ceremony this year owing to preoccupations. □

Modernization of Concrete Construction

Seminar & Exhibition

The importance of concrete construction and the need to modernize operations were the aspects which received particular attention by conferees at an international seminar held on 21-24 January 1982 at Madras. The seminar was organized by the Structural Engineering Research Centre (SERC), Madras, in association with other national institutions and international bodies: United Nations Centre for Human Settlements (HABITAT), Nairobi; Committee on Science and Technology in Developing Countries; and UNDP through its TOKTEN (transfer of know-how through expatriate nationals) project. More than 500 delegates, including 35 from 15 other countries, participated in the seminar, whose deliberations spanned six technical sessions. Discussed at the seminar were topics like mixing, handling and placing of concrete; forms, moulds and scaffolding; reinforcement, fabrication, accessories and concrete chemicals; new concretes; concrete repairs; and training, testing, and control services in concrete construction. State-of-the-art reports by Indian experts and keynote addresses by foreign counterparts provided the backgrounders for lively discussions that followed.

Focusing attention on the need to speeding up construction and achieving durable concrete structures, the seminar identified the scope for these in the Indian context both for domestic developmental projects and for international operations. Noting that the concrete construction industry with an annual turnover of more than Rs 50,000 million needs ready-mixed concrete and

pumping of concrete for large industrial projects as well as for construction in metropolitan cities, the seminar observed that forms, moulds and scaffolding have to be used on technically sound principles and as specialized subsystems to achieve good-quality concrete construction.

The seminar further suggested that supporting industries and specializations in reinforcement fabrication, accessories and production of chemicals such as superplasticizers and coatings for concrete should be encouraged and employed on a wider scale. Highlighting the potential for use of ferrocement, fibre-reinforced concrete and polymer concretes as new products and services, the seminar called for carrying forward of the laboratory level of understanding to development and application of technology in construction industry. Increasing attention, the seminar urged, ought to be paid to finding effective materials and methods for repair of concrete, especially because of the increasing environmental pollution and increasing use of concrete structures in marine environments.

Yet another area identified for immediate and massive efforts was the training for skills in concrete construction. For the gap between demand and supply would be too large, at around a lakh skilled operatives and supervisors a year in the next five years, what with the migration of work force to oil-rich countries.

It was the unanimous opinion of the participants that accumulating knowledge on concrete technology would not be of any avail if it was not matched by

awareness on the part of men-on-job about the variables in concrete properties and behaviour of concrete structures. The deliberations focused on the need for efforts by governments and building industry to identify and assign R&D projects in concrete construction with the goal-oriented task of achieving improvements outlined earlier. The seminar also resolved to carry forward

the message of modernization of concrete construction.

Forming part of the seminar was an exhibition depicting achievements in concrete construction, new products, equipment, tools, and accessories for concreting operations.

The seminar proceedings may be obtained from Shri Zacharia George, SFRC, Madras 600020. □

R.V. Gaveshani completes one hundred cruises in the Indian Ocean



The research vessel *Gaveshani*, the first oceanographic research vessel of its kind in India, belonging to the National Institute of Oceanography (NIO), Dona Paula, Goa, has successfully completed 100 cruises in the Indian Ocean. The occasion was marked by a function held on 24 February 1982 at the institute, which was presided over by Shri Jagmohan, Lt Governor of Goa, Daman & Diu, with Prof. S. Nurul Hasan, Vice President of CSIR, as the chief guest.

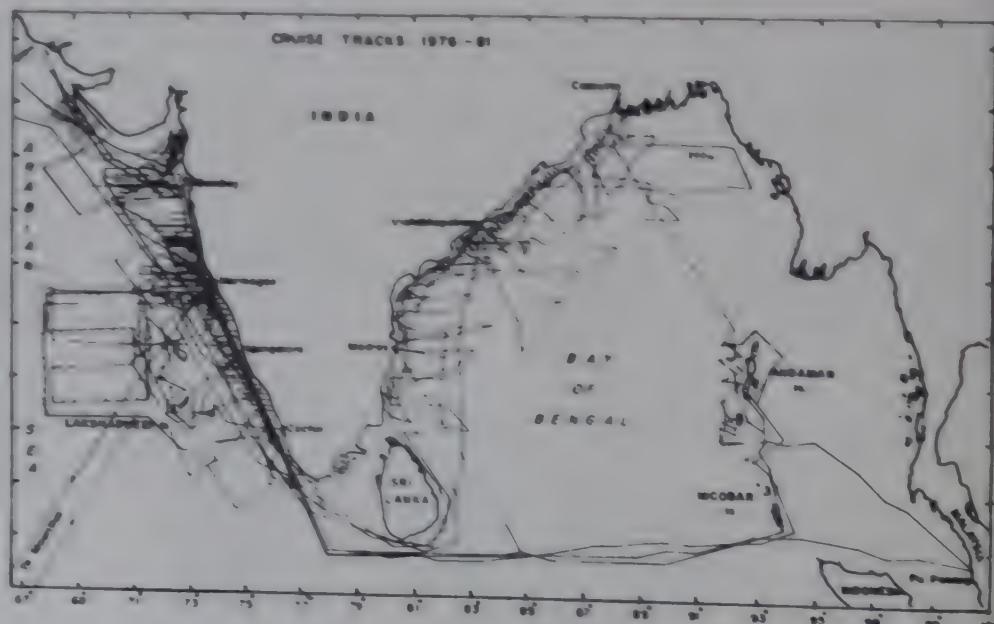
Welcoming the guests, Dr G.S. Sidhu, CSIR's Director General, traced the history of the research vessel and paid rich tributes to the late Dr N.K. Panikkar, founder Director of NIO, and Prof. Ghosh Roy, who designed the ship. Dr S.Z. Qasim, ex-Director of NIO, and presently Secretary in the Department of Ocean Development, and under whose guidance most of the cruises were undertaken, said *Gaveshani* had worked at sea on an average of more than 200 days a year, a record by itself from any standard. Appreciating the

performance of the research vessel, Shri Jagmohan in his presidential address wished the ship success in future also, and assured, on behalf of the government, all possible help to this

institute. Prof. Nurul Hasan spoke highly of the contributions of *Gaveshani* in collecting enormous amounts of data on all aspects of oceanography and thus enhancing our knowledge of the Indian seas. He congratulated the scientists who participated in all the cruises, the officers and crew of the Shipping Corporation of India Ltd who had manned the ship and many others who were involved from time to time for completing the 100 successful and eventful cruises, and wished success for its next century of cruises.

A medium-sized ship, R.V. *Gaveshani* is equipped with sophisticated equipment for carrying out multidisciplinary work in all seasons. Some statistical measure of *Gaveshani's* performance:

Total cruises undertaken	100
Cruises in the Arabian Sea	70
Cruises in the Bay of Bengal	20
Cruises devoted to sponsored projects	30
Cruises undertaken in collaboration with other organizations	10
Total stations covered	36,000
Total line kilometres	1,50,000
Participating organizations	30
Participants from NIO	22
Participants from other organizations	15



Research Vessel *Gaveshani* completed a century of oceanographic cruises (top)
Tracks of cruises undertaken by R.V. *Gaveshani* during 1976-81

In terms of her contributions, here are the more substantial of them:

- * Exploration and collection of poly-metallic nodules
- * Development of offshore oilfields including survey of submarine pipeline route from Bombay High to Bombay Harbour and many other routes
- * Identification of rich fishing grounds
- * Monitoring of oil pollution in Indian seas and location of suitable sites for discharge of wastes
- * Survey for site location for ocean thermal energy conversion plant
- * Participation in Monsoon Experiment-1979 to study development of monsoons, vital for the country's economy
- * Study of Andaman and Lakshadweep seas, little known till then
- * Training and developing expertise and manpower to meet the challenging tasks at sea.

Two booklets—one on R.V. *Gaveshani* and the other on NIO—were released on the occasion by Shri Pratap Singh Rane, Chief Minister of Goa, Daman & Diu. □

Drug for treatment of rheumatoid arthritis commercially produced

A herbal drug for treatment of rheumatoid arthritis, based on researches carried out at the Regional Research Laboratory (RRL), Jammu, has been commercially produced. *Salai guggal* is the drug produced and marketed by a pharmaceutical outfit, Gufic Private Ltd, Bombay, under the brand name *Sallaki*. The drug's therapeutic indications are in the treatment of rheumatoid arthritis, osteoarthritis, juvenile rheumatoid arthritis, soft tissue rheumatism, low back pain, myositis, and fibrositis. □

Grafting of acrylate monomers onto chlorinated rubber

The chemical combination of two or more structurally dissimilar polymers by graft copolymerization has been of academic as well as commercial interest for a number of years. Further, the

increased importance of graft copolymers in leather finishes has been fairly recognized. It has been found that chlorinated rubber lacquer, when applied to leather, forms films which are resistant to alkalis and acids but the films as such crack on the surface of the leather. To impart inherent flexibility to the films, they have to be modified structurally to satisfy the end users, and graft copolymerization provides a convenient route for this modification. Shri K. Kaleem of the Central Leather Research Institute (CLRI), Madras, has attempted modification of chlorinated rubber by graft copolymerization of various acrylate monomers.

The grafting of acrylate monomers onto chlorinated rubber was carried out both in solution medium and in emulsion. Soft acrylate monomers such as ethyl acrylate and *n*-butyl methacrylate were readily grafted with benzoyl peroxide as initiator in xylene solution. In the heterogeneous medium (emulsion), the graft copolymerization of *n*-butyl methacrylate was effected by using sodium lauryl sulphate as emulsifier and potassium persulphate as initiator. A complete separation of graft copolymers and ungrafted homopolymers was achieved by fractional precipitation and selective solvent extraction methods.

The pure, fractionated graft copolymers were characterized by spectroscopic and chromatographic techniques. Sufficient proof was obtained from the higher values of the chain transfer constants of the graft copolymerization reactions. The solubility behaviour of the graft copolymer differed from that of parent backbone and homopolymers. IR and NMR studies revealed the presence of side chain acrylate polymer chains in the graft copolymer. The gel permeation chromatographic (GPC) analysis clearly established the chemical binding between the backbone polymer and the acrylate side chains.

The per cent grafting and grafting efficiency were found to increase with increase in backbone concentration.

The concentrations of monomer and initiator were found to be important factors influencing the grafting efficiency. The chain transfer constants (C_p) for various grafting reactions were evaluated. The molecular weights of the isolated homopolymers and ungrafted copolymers were determined by viscometry. The kinetic aspects of the grafting reactions in a homogeneous medium were studied and a probable mechanism of graft copolymerization was suggested based on chain-transfer process. Studies on mechanical properties such as tensile strength and per cent elongation revealed that the film characteristics of chlorinated rubber can be regulated by the grafting process.

The lacquers of the graft copolymers were evaluated as leather top-coat materials. The wet and dry rub resistances of the finishes are comparable with those of the standard top coats available in the market and a majority of the finishes are able to withstand the required flexes for the top coat.

Shri Kaleem, who worked under the guidance of Dr S. Rajadurai and Dr C. Rami Reddy, was awarded Ph.D. degree by the University of Madras, Madras, for his thesis based on the studies. □

Homogenization of earthquake magnitudes

Significant differences in magnitudes for the same earthquake are often reported by individual seismograph stations as well as by agencies which collect seismological data from a number of stations. These differences lead to undesirable uncertainties in seismology, seismic hazard mitigation, building construction codes, and earthquake prediction research. To minimize the differences in magnitudes, a study on 'Homogenization of earthquake magnitudes based on the vertical component short period P wave data' was carried out by Shri M.V.D. Sitaram at the National Geophysical Research Institute (NGRI), Hyderabad.

The researcher has derived an

empirical amplitude-distance curve for the vertical component short period P waves of nuclear explosions at teleseismic distances. The curve was found to be nearly flat in the distance range 30° to 77° . Station factors for the Hyderabad (HYB) station were investigated. HYB magnitudes were found to be larger than those reported by United States Geological Survey (USGS) by 0.25 units. By the use of the mean magnitude method, station factors for 77 stations distributed all over the world in the distance interval 40° to 80° were estimated for short period PV waves of shallow earthquakes. Similarly, by the use of short period PV wave data of nuclear explosions, station factors for 62 stations in the distance interval 30° to 77° were determined on the basis of relative amplitude criterion. Sino-Soviet nuclear explosions have been discriminated from shallow earthquakes occurring in the nearby regions, on the basis of surface wave magnitude versus body wave magnitude criterion. The maximum velocity amplitudes of P and S waves in different passbands were studied from the filtered broadband records of Kasperske Hory station in Czechoslovakia for some selected shallow earthquakes of Tadzhik-Sinkiang border and north-eastern China. From the amplitude passband (APB) diagrams, the largest values of A_{vmax} were found to be in the passband of 2.2 to 10s for P waves and from 3.4 to 23s for S waves. A shift of the maximum of the APB diagrams towards longer periods for earthquakes of magnitude $m_b > 6.0$ was observed. The position of the maximum was not dependent on the magnitude in the range $5.0 < m_b < 6.0$. Short-period PV wave magnitudes for ten randomly selected shallow earthquakes were estimated by using depth-distance compensation factors derived in the present study. The station factors determined on the basis of the mean magnitude method were applied to these magnitudes and were found to be homogenized.

Sl -i Sitaram, who worked under the guidance of Dr Harsh K. Gupta of NGRI and Prof. R.K. Verma of the Indian School of Mines (ISM), Dhanbad, was awarded Ph.D. degree by ISM for his thesis based on the study. □

PROGRESS REPORTS

CECRI Annual Report: 1980-81

The annual report of the Central Electrochemical Research Institute (CECRI), Karaikudi, for 1980-81, published recently, reveals that seven of its processes relating to calcium gluconate, potassium chlorate, phosphating jelly, corrosion prevention in RCC and RCBW, Portland cement coating on steel, acid inhibitor in solid form, and coatings for corrosion prevention in RCC construction went into production during the year. Seven CECRI's processes were licensed by the National Research Development Corporation of India (NRDC) to various parties for commercialization: lead acid battery, potassium chlorate, etching of aluminium foil for capacitors, aluminium alloy anode for cathodic protection, anti-corrosive packaging paper, red lead-red oxide primer, and copper plating on stainless steel. Six processes were assigned to NRDC: electrical jointing compound, anti-corrosion packaging paper, zinc ethyl silicate primer, calcium carbide, zinc silicate green phosphor, and electrolytic chromium. Six consultancy services were completed during the period under review.

Under All-India Coordinated Projects a comprehensive report of CECRI's research and development activities on metallic corrosion and its prevention was prepared. Among the consultancy services completed mention may be made of those relating to (i) protection of steel structures under wet and dry conditions at Tuticorin port, and (ii) protection against corrosion of line supports, conductors, and hardware in the T&D system of the Maharashtra State Electricity Board.

A modular type, 2500 A capacity cell for the production of magnesium metal was developed. The advantages of the new design are reduction in energy consumption, saving of space, and possibility of scale-up to very high amperage capacities. In this cell, energy consumption for magnesium production could be brought down to 14-15 kWh/kg(dc) as against the present level of 22-25 kWh/kg.

For battery-powered vehicles, two cells of 2V/300 Ah module type were fabricated by using 1 mm rubber separators. The battery with the electrotpe weighed 21.2 kg and gave a capacity of 282 Ah at 5 h rate.

A large number of magnesium-manganese dioxide cells of 7.5 Ah rated capacity were fabricated.

All the equipment needed for the project on preparation of calcium chromate iron oxide primers in large scale for application to structures in marine and industrial environments were procured and erected. Corrosion inhibitor formulations (silicate-carbonate-chromate combination, and amine-citrate-silicate combination) were evaluated in waters containing 100 ppm NaCl and found to be good.

A coulstatic set-up for studying corrosion of metals in a highly resistant medium such as conductivity water was fabricated and successfully employed for studies with distilled water in the absence as well as in the presence of different concentrations of chloride ions at ppm levels. An instrument for measuring polarization resistance was designed and fabricated. A zone-sintering furnace in a vertical position with zirconia tube as sagger to maintain a temperature of 1700°C was fabricated.

Conditions were standardized for the electrolytic oxidation of lactose in a 40A cell and for isolating the product. The sample of calcium lactobionate evaluated by a firm was found to conform to the required specifications.

A 150A membrane cell was designed and fabricated for the ion-exchange

membrane process of production of high-purity caustic soda.

In electroplating, electrodeposition and metal-finishing, brighteners for iron-zinc alloy and nickel-zinc alloy electrodeposits were formulated and the deposits obtained were tested for corrosion resistance. Several formulations suitable for use in brush plating were worked out. Some of these formulations are for depositing (i) black chromium on brass/copper, (ii) bright nickel on brass/copper/mild steel, (iii) tin on aluminium/mild steel/brass, (iv) silver on aluminium, and (v) copper on aluminium/stainless steel.

Six projects were completed during the year. These related to: (i) electrical jointing compound, (ii) anti-corrosion packing paper, (iii) zinc ethyl silicate primer, (iv) calcium carbide, (v) zinc silicate green phosphor, and (vi) chromium sheets for welding electrode manufacture.

A bimonthly periodical 'Corrosion Bulletin' was started. Technical information was provided to parties against payment of fees on: corrosion performance of various materials in zinc sulphate solution; behaviour of cast iron, AC and GI pipes in corrosive soils; and corrosion behaviour of metals in sodium hypochlorite, sulphur dioxide, sulphur trioxide, and sulphuric acid.

Twenty-two research papers were published and 18 patents were filed during the year. □

NRDC-CSIR Processes

Ninety-three (nearly 80%) of the 119 agreements for commercialization of processes signed by the National Research Development Corporation of India (NRDC) during 1980-81 pertained to the work of CSIR laboratories. This is revealed by the NRDC's annual report for that period. The report also shows that out of the 41 new processes received, 28 belonged to CSIR laboratories. The laboratory-wise break-up of CSIR processes is: Central Electrochemical Research Institute, Karaikudi-6; Central Electronics

Engineering Research Institute, Pilani-4; Central Food Technological Research Institute, Mysore, and Regional Research Laboratory, Hyderabad-3 each; Structural Engineering Research Centre, Madras, and Mechanical Engineering Research and Development Organisation, Madras-3 together; Regional Research Laboratory, Trivandrum, Central Glass & Ceramic Research Institute, Calcutta, and Central Building Research Institute, Roorkee-2 each; National Metallurgical Laboratory, Jamshedpur, Central Scientific Instruments Organisation, Chandigarh, and Central Salt & Marine Chemicals Research Institute, Bhavnagar-1 each.

The total number of processes received by NRDC up to 31 March 1981 was 2147, out of which 1361 came from CSIR. Processes licensed on payment of royalty and premium numbered 990; 120 processes were released free. Of these, the shares of CSIR were 822 and 112 respectively. □

Toxicology Data Sheets on Chemicals: Dimethoate

This is the sixth in the series of toxicology data sheets on chemicals being compiled by the Industrial Toxicology Research Centre, Lucknow. Contains a brief account of the properties and toxicological effects of Dimethoate, and references (96) to literature pertaining to the pesticide. The data sheet is obtainable (free of charge) from: The Director, Industrial Toxicology Research Centre, Lucknow 226001. □

SERC Course on Industrial Structures

The Structural Engineering Research Centre (SERC), Madras, organized an advanced course on 'Modern Developments in the Design and Construction of Industrial Structures' from 22 February to 5 March 1982.

Twenty-nine participants from public and private sector organizations and government departments, including two

from Iraq and one from Sri Lanka, attended the course in which 30 lectures covering planning, analysis, design, and construction of steel and concrete industrial structures were delivered.

Field visits to construction works at Madras Port Trust and visits to SERC laboratories were also arranged. □

DEPUTATION BRIEFS

Prof. Dinesh Mohan

Prof. Dinesh Mohan, Director, Central Building Research Institute (CBRI), Roorkee, participated in the first meeting of the coordinating committee of the International Conference on Materials, Techniques and Components for Housing in Developing Countries, held in Paris, 4-5 March 1982. The conference is being organized under the joint sponsorship of Ecole Nationale des Ponts et Chaussees (ENPC) and Centre Scientifique Travaux et Technic du Batiment (CSTB).

Prof. Dinesh Mohan spoke of the important role CBRI had played at the national and international scenes with special reference to low-cost housing, primary school buildings, and health buildings for the rural and urban areas. He described CBRI as counterpart of CSTB in France and the University of Roorkee as counterpart of ENPC.

The meeting discussed areas where sufficient papers had not been contributed and identified persons, together with the institutions, who could be requested to contribute papers, reports Prof. Mohan. Technical sessions of the conference would cover principally: earth, concrete, cellulosic material, binders, sanitation, and disaster-resisting structures. A suggestion made by the CBRI Director that authors should be requested to bring out special and difficult problems encountered during construction of housing with new and improved materials and techniques, both social and technical, and how they were overcome, was well received.

There is a possibility of exchange of scientists between CSTB and CBRI.

observes the CBRI Director. Another observation made by the India's delegate of significance to CBRI and CSIR is that CBRI's expertise might find application in projects sponsored at international level by ECA and UNCHS and other international bodies. □

PERSONNEL NEWS

Appointments/Promotions

At the National Chemical Laboratory (NCL), Pune, Dr M.G. Kulkarni has been promoted as Scientist C (24 Dec. 1981); others promoted are Dr U.R. Kalkote, Dr M. Narayana Rao and Shri D.R. Saini, all as Scientist B (the first two effective 10 Dec. 1981 and the third, 24 Dec. 1981); and Shri H.P. Chakrabarty as Technical Officer B (24 Dec. 1981).

Retirements

Shri V.S. Krishnamachar and Dr V.V. Dhekne of the National Chemical Laboratory, Pune, retired on 31 December 1981.

Shri Krishnamachar, who joined NCL in 1951, headed the National Collection of Industrial Microorganisms (NCIM) group from 1957 onwards and was responsible for building it up. He also compiled the NCIM culture catalogue.

Dr Dhekne, who was with NCL for 25 years, was associated with a number of research projects in the Organic Chemistry Division, and has made outstanding contributions in synthetic macrocyclic musk compounds.

Honours & Awards

Dr J. Coggin Brown Gold Medal to Shri A.K. Datta
Shri A.K. Datta, Officer in charge of the Ranchi coal survey laboratory of the Central Fuel Research Institute (CFRI), Dhanbad, has been awarded Dr J. Coggin Brown Gold Medal for geological sciences for 1979-80. Instituted by the Mining, Geological and Metallurgical Institute of India (MGMI), the award was given away at the MGMI's 76th annual general

meeting held in Calcutta on 12 February 1982.

With CFRI for over 20 years, Shri Datta has worked on the resource quality assessment of coals and made exploratory studies on washability characteristics of potential coals from Bokaro, Ramgarh, Karanpura, Auranga, Hutar and Daltonganj coal-fields. His work has enabled proper assessment of coal and has helped fix



prices for coals produced from these areas. Other spinoffs of his researches include installation of washeries and thermal power stations, assessment of medium coking and blendable coals for iron and steel industries, loco fuels and for various other industries.

Shri Datta has to his credit 20 scientific publications, 32 technical reports, and 5 books besides many popular articles on geology. He has also authored a book on physical geology, which has received wide appreciation. Earlier, Shri Datta had twice received medals from MGMI. □

PATENTS FILED

707/Del.81: An improved process for the preparation of aromatic hydrocarbons from ethyl alcohol in a single-step conversion. S.B. Kulkarni, P. Ratnasamy, I. Balakrishnan, B.S. Rao, A.J. Chandwadkar & A.N. Kotasthane—National Chemical Laboratory, Pune.

805/Del/81: An improved process for the production of thin spiral carbon electrodes. R. Gangadharan, P.N.N. Namboodiri, K.V. Prasad & H.V.K. Udupa—Central Electrochemical Research Institute, Karaikudi.

The Council proposes to appoint Director for its Central Building Research Institute, Roorkee.

The institute undertakes research in building science and technology, and its major areas of work are in building materials, efficiency of buildings, building processes, plant productivity, and rural housing. As director of the institute, the incumbent will be expected to provide a high-level leadership in the formulation of R&D programmes and projects, organizing and coordinating team work, and promoting application and utilization of the results of research. He will have the overall responsibility for the institute and in the attainment of its objectives.

Qualifications: High academic qualifications in civil engineering and sufficient experience of research and development in building science and technology. The incumbent must have proven ability to guide scientific workers and preferably have experience of large-scale building construction.

Age: Below 50 years, relaxable in deserving cases

Scale: Rs 2500-125/2-3000 plus allowances at the Central Government rates. Accommodation is available in the campus. This is a contractual appointment for six years but the contract is renewable and the incumbent can also be confirmed.

Those who are interested may send their *curriculum vitae* in the standard form to the Chief (Administration), Council of Scientific & Industrial Research, Rafi Marg, New Delhi 110001 on or before 20 May 1982. A copy of the brochure and annual report of the institute will be supplied on request.

The Council of Scientific & Industrial Research proposes to appoint Scientists F in its various constituent laboratories. The respective discipline/area and the CSIR constituent laboratory as also the deadline for sending *curriculum vitae* are as follows:

Advt. No. 17/82: Structural mechanics, National Aeronautical Laboratory, Bangalore—13 May 1982.

Advt. No. 19/82: Technical Information & Industrial Liaison Division, Central Drug Research Institute, Lucknow—20 May 1982.

Advt. No. 22/82: Industrial microbiology, Regional Research Laboratory, Jammu—20 May 1982.

The pay scale for these posts is Rs 2000-125/2-2500 plus allowances at the Central Government rates. Prescribed forms for sending the *curriculum vitae* are obtainable from the Chief (Administration), Council of Scientific & Industrial Research, New Delhi 110001, from whom further details regarding the above posts may also be obtained. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

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Futurology of Mineral & Metal based Industries Workshop at RRL-Bhubaneswar

The need to increase production of coal and aluminium was emphasized at a two-day workshop on the title topic. The workshop, organized by the Regional Research Laboratory (RRL), Bhubaneswar, under the sponsorship of the Department of Science and Technology, on 8-9 January 1982, viewed the technological needs of the utilization of minerals in the coming decade against the background of reserves, projected demands, and contemporary trends. Papers presented dealt with coal, iron and steel, aluminium, copper, lead, zinc, non-ferrous minerals, industrial minerals, and refractory minerals. Since oil-deficient countries have to depend in future more and more on coal, it is necessary, the workshop concluded, to lay emphasis on all aspects to increase production and supply of coal to meet thermal and metallurgical needs. More important among these efforts would be: (i) coal preparation—reduction of abrasive and inert ash in thermal coal and meeting the international practice of 5-7% ash in coking coal—by resorting to new techniques of beneficiation including energy-efficient methods of size reduction; and (ii) transportation of thermal coal by pipeline, following beneficiation, to the existing thermal plants as an alternative to fluidized combustion of high-ash coal. The workshop also recommended exploration of means to use high-ash, high-volatile non-coking coal for chemical and metallurgical use.

With regard to the increase in use of aluminium as an electric conductor in

addition to its use as a versatile material of construction, production of aluminium would have to be stepped up. It was considered worthwhile to improvise means to produce the metal at low energy and at reduced cost by improving the cell design and innovating alternative methods for production of alumina and aluminium. That an aluminium research institute should be established was a centre-piece suggestion the workshop made.

The workshop laid emphasis on conservation, besides exploration to increase the resource base, in production and use of minerals for recovering base metals like copper, lead and zinc along with the noble metals associated. Attention had to be paid in particular, the workshop felt, to reducing losses occurring at mines and processing plants, and development of technologies appropriate to small-sized but complex ore deposits either to produce feed to the existing smelters or to develop new processes to recover metal values.

In the area of refractories, the workshop felt it essential to develop technology to make use of available raw materials to reduce dependence on imports. It might be necessary to establish custom mills in various parts of the country to exploit many small deposits of industrial minerals like china clay and graphite, the workshop observed.

Also emphasized at the workshop was the need for a national directory on industrial minerals, facilities for complete characterization of minerals, and

exploration for mining at depth for increasing the resource base.

Shri B.K. Biswal, Orissa's Minister of State for Mining & Geology and Works, Housing & Urban Development, who inaugurated the workshop, underscored the need, because of the continuously increasing demand for minerals and their non-renewable nature, for a perspective plan for their exploitation in future. We should aim at complete utilization of mineral resources by recycling, conservation and utilization of low-grade ores, without neglecting the need for protection of environment, for prevention of pollution and for maintenance of ecological balance, the minister added.

Earlier, in his welcome address, the RRL's Director Prof. P.K. Jena underscored the need for putting in greater efforts for the development of mineral- and metal-based industries in our country, these being the base for growth of other industries. Referring to the reserves of minerals, he opined that unless consolidated and coordinated efforts were made for extensive exploration, deep and selective mining, large-scale beneficiation, and energy-saving metal extraction and substitution for scarce metals, we were bound to face a great crisis in the very near future to

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meet the basic human needs. He called for a systematic survey of all types of minerals on land and offshore, better mining practices, followed by complete recovery of all metal values from all sources including lean ores, wastes and byproducts, and substitution of scarce

raw materials/end products with other more abundant ores.

Participants in the workshop included representatives from R&D institutions, public sector undertakings, consultancy firms and other organizations. □

Precambrians of South India

Indo-US Workshop at NGRI

Though the collaborative work between the National Geophysical Research Institute (NGRI), Hyderabad, and the National Science Foundation of USA on the Precambrians of South India was started in 1978, the actual work in precambrian geology of India had commenced as early as in 1965. To review the work done and to evolve a future programme of work, NGRI, NSF and the Geological Society of India organized jointly a four-day workshop on Precambrians of South India at NGRI during 12-15 January 1982. The deliberations of the workshop spread over four technical sessions: Geology and structure of Indian precambrian terrain; Stratigraphy-lithology and geochronology; Geochemistry; and Continental crust evolution of Indian craton; the future programme for studying 'Eastern Ghats' was discussed at a separate session. Forty-two papers were presented and about 85 delegates, including 23 from USA, UK, FRG and Australia, participated. NGRI's scientists contributed 15 papers based on the institute's integrated geological, geochemical, geophysical and geochronological studies over various schist belts and the adjoining gneisses within the Dharwar craton. NGRI has covered about 3000 km² and has collected about 400 samples; 1256 gravity and 462 magnetic stations have been established. It has also prepared geological maps of different schist belts, viz. Hole Narasipur, Nuggihalli, Krishnarajpet, Shiegegudda, Chitradurga and Javanahalli.

In his paper, S.M. Naqvi (NGRI) indicated the occurrence of more than one type of greenstone belt of more than 3.5 billion years old in Dharwar craton. The order of these belts was reported to be significantly different in their composition and abundance of rock types from that of the younger ones. He proposed a five-fold tentative classification and division of various types of greenstone belts and acid plutons covering a period of 1500 million years.

K. Naha (IIT, Kharagpur) and A.K. Chatterjee (NMDC, Hyderabad) contended that there were three generations of small- to large-scale folding in the Bababudan Hill ranges in Karnataka. They observed that the structural

sequence in the Bababudan area was not unique and was present in other parts of Karnataka also.

Y.J. Bhaskara Rao and S.M. Ahmed (NGRI) observed that the Bababudan supracrustals (approx. 2800 million years old) comprised essentially metavolcanics with significant ultramafic-ultrabasic rock association, particularly in the lower stratigraphic levels. These supracrustals represented the onset of pro-geosynclinal basin-craton type tectonics, characteristic of the late permobile and transitional phases of the evolutionary history of the earth's crust in the cratonic domain of Karnataka.

B.L. Narayana, S.M. Naqvi and P. Rama Rao (NGRI) inferred that the Javanahalli schist belt was a distinct and different sequence unlike the Hole Narasipur, Nuggihalli and Krishnarajpet schist belts which were broadly homotaxial and characterized by basic/ultrabasic rock type at the base. They visualized at least three types/periods of acidic activity in and around the Javanahalli schist belt, all of which had shown an intrusive relationship with the schist belt components.



Dr G.S. Sidhu, Director General, CSIR, inaugurating the Indo-US Workshop on Precambrians of South India. Also seen are (from left) Dr Hari Narain, NGRI Director, and Dr John J.W. Rogers, leader of the US delegation

V. Rajamani and N. Sivasiddaiah [Jawaharlal Nehru University (JNU)], who had studied the geochemistry of the gold-bearing sulphide lodes in Kolar Gold Fields, put forth the view that deposition of gold could have taken place from hydrothermal brines during the accumulation of submarine volcanics of the Kolar greenstone belt. Their inference was that the high MgO series of the metavolcanics could constitute a possible source of gold.

K. Shiv Kumar (Atomic Minerals Division, Hyderabad), V. Rajamani (JNU), S. Shirey and G.N. Hanson (USA) were of the view that various metavolcanics of the Kolar schist belt were evolved from melts generated from iron-enriched mantle and non-mantle sources at different depths by continuous and batch melting and also by fractional crystallization processes.

T.W. Donnelly and S. Argast (Department of Geological Sciences, State University of New York), who had studied the chemistry of Dharwar meta-sediments, observed that the volume of sedimentary materials was minimal during the Archaean time and that the chemistry of these materials was dominated by igneous processes. They observed that sediments poor in iron also occurred along with iron-rich sediments and suspected that the character of the Archaean ocean mobilized iron the way manganese is mobilized in the present ocean.

According to Kent C. Condie (New Mexico, USA) the geothermal and lithologic differences during the Archaean could be accommodated in a model for early Archaean crustal development in which greenstones formed on oceanic crust near tonalite islands over convective down currents. High-grade supracrustals formed within, and on stable margins, of tonalite islands and late Archaean greenstones formed in continental rifts over mantle plumes.

Reviewing the history of the Dharwar craton from 3200 to 2100 million years, C.S. Pichamuthu and R. Srinivasan

(Department of Mines and Geology, Bangalore) contended that the bulk of the peninsular gneiss was syntectonic with reference to Dharwar folding. According to them, the high-grade supracrustals (Surgur group) and bulk of the gneisses were not pre-Dharwar.

R.D. Backinsale *et al.* (Institute of Geological Sciences, London), who had made geochronological and REE studies on the Archaean gneisses and granites of Karnataka, concluded that the Karnataka craton has evolved and stabilized by additions to the crust from the mantle and probably by reworking of previously formed crustal rocks.

M. Ramakrishnan and M.N. Viswanatha (Geological Survey of India) reviewed the present data and models on the crustal evolution of Karnataka craton and showed that the supracrustal rocks were divisible into two major tectonic cycles, viz. older Surgur groups, and younger Dharwar supergroup. This two-fold classification was established on the basis of angular unconformities marked by supermature conglomerates and injection of tonalitic to granodioritic gneisses at certain places. Such a profound break between the rock sequences, according to them, negated the alternative concept of one supercycle for the craton punctuated by several minor interludes. They were of

the opinion that the Dharwar supergroup was underlain by sialic crust during its evolutionary history.

Prof. D. Lal (Physical Research Laboratory), Prof. C. Ponnampetuma (Sri Lanka) and Dr W.C. Phinney (USA) gave special lectures on 'Extra terrestrial data and early crustal genesis', 'Evidence for Archaean life', and 'Lunar and planetary evolution' respectively.

Prof. John J.W. Rogers, leader of the US delegation, presented a report on the progress of the cooperative project between NSF and NGRI.

Dr B.P. Radhakrishna of the Geological Society of India, Bangalore, in his presidential address proposed survey of the entire granite greenstone terrain in south India. According to him, the growth of the Indian sub-continent had taken place in four stages during the early history of earth and these stages were preserved well in Karnataka and Andhra Pradesh.

Earlier, Dr Hari Narain, NGRI's Director, in his welcome address said that a sophisticated Rs 14 million geochemical laboratory would be established at NGRI.

Dr G.S. Sidhu, Director General, CSIR, who inaugurated the workshop, complimented the Indian scientists for their successful landing on Antarctica and said that this expedition would open new vistas of knowledge. □

NPL designs and develops a double-beam photoacoustic spectrophotometer

Following the design and development of a simple single-beam photoacoustic spectrophotometer [CN, 30 (1980), 161], the National Physical Laboratory (NPL), New Delhi, has now designed and developed a double-beam photoacoustic spectrophotometer for the spectral range ultraviolet, visible and near-infrared. The spectrophotometer can be operated simultaneously in either the single-beam or double-beam mode.

The device has emerged as a research tool for investigating optical and thermal properties of non-gaseous

materials and surfaces, where the conventional optical absorption and reflection spectroscopic techniques fail. It has been used in various branches of physics, chemistry, biology, medicine, agriculture, and other sciences.

The block diagram of the double-beam photoacoustic spectrophotometer developed by NPL is shown in Fig. 1. The continuous radiation source employed in the UV region is a 1000 W xenon short-arc lamp with an ellipsoidal reflector. As the arc lamp generates considerable heat, the radiation from

the lamp-housing is allowed to pass through a double-walled cell, 25 cm thick and fitted with quartz windows. Distilled water is filled in the cell, and running water is circulated in the outer jacket of the cell to cool the distilled water. A heat sink, the cell protects the optical components from getting damaged by the intense heat radiation generated by the source. The radiation source employed in the visible and in the near-infrared is a 600 W tungsten-iodine lamp with a condensing mirror and a provision for cooling the source.

The radiation from the lamp-housing is focused on to the entrance slit of a grating monochromator having entrance and exit slits of fixed widths of 2000 μm each. Four gratings blazed at 300 nm, 500 nm, 1.1 μm and 2.1 μm cover the entire spectral range. Grating is used in Ebert mounting with $f/3.5$ optics providing bandwidths of 2 to 8 nm in the entire spectral regions. Suitable-order shorting fillers are used just before the exit slit to eliminate higher orders. The monochromatic radiation from the exit slit is modulated

by a variable-frequency optical chopper with a provision to vary the frequency continuously from 5 to 4000 Hz.

The monochromatic radiation from the exit slit thus modulated and condensed by a quartz lens is split intensity-wise into two halves. One irradiates the sample cell and the other the reference cell containing carbon black as sample. Reference and sample cells are identical and acoustically sealed chambers fitted with condenser microphones and windows of the material transparent to the spectral region of interest. The signals thus obtained from these microphones are processed by two identical lock-in amplifiers and the

outputs are fed to a radiometer. The ratio of these two signals is a normalized spectrum and is recorded either on an X-Y recorder or on a strip-chart recorder.

When the outputs from individual lock-in amplifiers are recorded on a two-pen strip-chart recorder, the spectrometer is in the single-beam mode. Conversely, when the signal from the radiometer is recorded, the spectrometer is in the double-beam mode. The latter mode operation has an advantage that in this mode the spectrum is fully normalized and is free from the source intensity fluctuations, atmospheric absorption, and other electrical disturbances.

Normalized photoacoustic spectra of various liquid and solid samples were directly recorded by this spectrophotometer. The spectrum of carbon black was recorded in both the modes. In the case of double-beam mode the atmospheric water vapour absorption peaks at 1.1, 1.4 and 1.9 μm were absent, making the base line quite flat.

Further details regarding the spectrophotometer can be had from Dr R.S. Ram, Spectroscopy Section, National Physical Laboratory, New Delhi 110012. □

Roofing sheet plant with RRL-Jorhat know-how at Rangoon

A corrugated roofing sheet plant, supplied by the Regional Research Laboratory (RRL), Jorhat, to the Government of Burma has been successfully commissioned recently at Rangoon. The assignment was award-

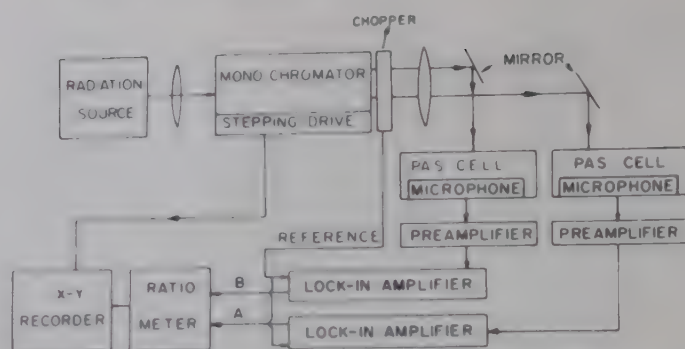


Fig. 1—Block diagram of double-beam photoacoustic spectrophotometer developed at NPL

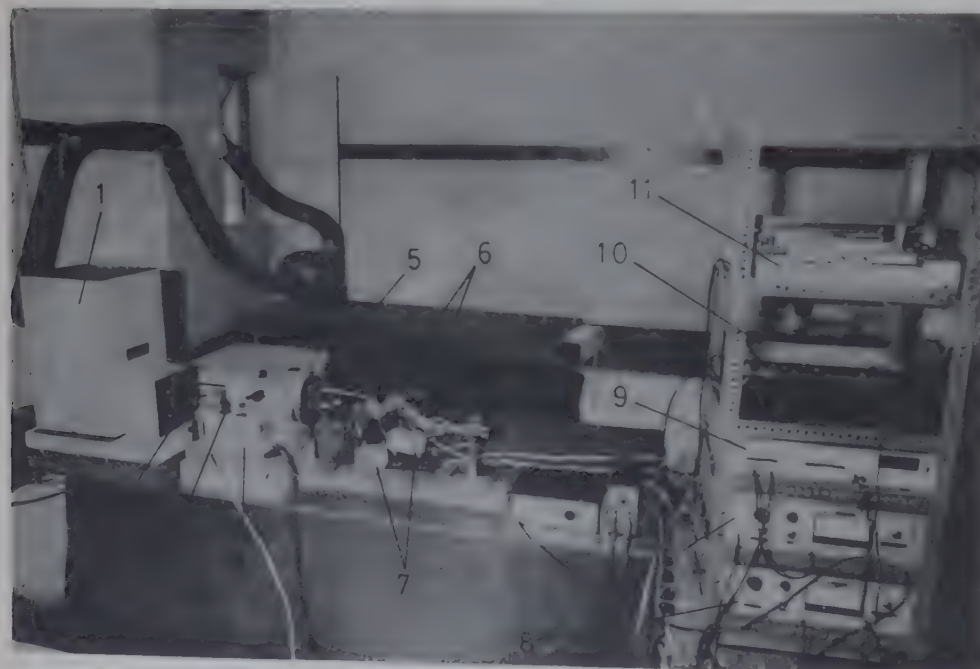


Fig. 2—Double-beam photoacoustic spectrophotometer showing various sections: 1. xenon arc lamp, 2. focusing optics, 3. distilled water cell, 4. monochromator, 5. variable frequency chopper, 6. condensing mirrors, 7. sample cells, 8. lock-in amplifiers, 9. radiometer, 10. X-Y recorder, 11. strip-chart recorder

ded, on turnkey basis, to the laboratory by the National Research Development Corporation of India, under the Indian Technical and Economic Cooperation programme.

Scientists from RRL-Jorhat, deputed to Burma for three weeks (during Dec. 1981-Jan. 1982), installed and commissioned the plant. All the equipment was tested and trial runs were conducted successfully. Corrugated sheets of desired specification were produced during trial runs. The scientists also assisted Burma's Central Research Organisation in carrying out tests for evaluating the product.

The low-cost, light-weight sheet made from waste cellulosic materials is a suitable roofing material, particularly for the rural poor. It has been developed through the joint efforts of this regional laboratory and the Central Building Research Institute, Roorkee. The sheets are fire- and water-resistant. Their light-weight ensures a considerable saving in the substructure of the roof. The sheets are durable and of high strength, not brittle as asbestos-cement sheets. The other advantages: no specially skilled labour is required, the machinery and raw materials are indigenously available, and maintenance is easy. The technology can be adopted by the rural industry.

A government-owned unit set up, on turnkey basis, with RRL's assistance at Pasighat in Arunachal Pradesh has also recently started production of such light-weight roofing sheets. □

Physico-chemical studies on some active oxides of manganese

Manganese dioxide is extensively used as a cathode material in batteries and also as a catalyst. Tetravalent manganese oxide occurs freely in nature and is also synthesized for use in batteries. The physico-chemical properties of synthetic MnO_2 are considerably influenced by the method of preparation and subsequent treatment. Although several attempts have been made to find

out the origin of reactivity in MnO_2 , why a particular variety is more active than the others is not well understood. Shri Kulamani Parida of the Inorganic Chemicals Division of the Regional Research Laboratory (RRL), Bhubaneswar, has studied various physico-chemical properties of synthetic MnO_2 samples in detail and correlated them with the depolarizing activity, catalytic activity, and ion-exchange behaviour.

A number of synthetic manganese dioxide samples of various polymorphic forms such as α , β , γ - and δ - MnO_2 were prepared by different methods. The chemical compositions of all the samples were determined to understand the state of water and to derive empirical formulas which correlate well with their predicted characteristics. Thus, good agreement between the pycnometric density values and those calculated from empirical formulas and uniceil parameters indicate a major defect in synthetic MnO_2 samples in anion vacancy.

Depolarizing capacity of MnO_2 samples has been studied in the presence of both $\text{NH}_4\text{Cl-ZnCl}_2$ (pH 4.1) and 9 M KOH media. This is correlated with surface area, surface oxygen, surface OH groups, density, lattice parameters, water content (free and combined), magnetic susceptibility, etc.

Differential thermal analysis and thermogravimetric analysis, including kinetics of dehydration and decomposition, were made to understand the state of water and activation energy of dehydration. These data have been used to correlate with depolarizing capacity. The effect of heat treatment of some MnO_2 samples on their electrochemical and catalytic activity was also investigated.

The catalytic activity of MnO_2 samples has been determined from the rate of decomposition of H_2O_2 in aqueous solution. Two mechanisms depending upon the pH of the medium have been proposed. Interesting correlations between the initial rate of decomposition of H_2O_2 and various

physico-chemical properties as well as electrochemical activity of the samples have been obtained.

Ion-exchange is an important phenomenon controlling the discharge capacity of MnO_2 , and, in this context, ion-exchange characteristics of different synthetic MnO_2 samples along with other related phenomena such as Bronsted acidity, isoelectric point, and adsorption potential have also been investigated.

Shri Parida, who worked under the guidance of Dr B.R. Sant of the same laboratory, has been awarded Ph.D. degree in chemistry by the Utkal University for his thesis based on these studies. □

Phytotoxic effects of Endosulfan

The ecotoxic potential of chemical insecticides is well known. There is however a need to develop sophisticated test systems for evaluating their efficacy, environmental impact, and safety to humans. In an ongoing multidisciplinary R&D programme, the Industrial Toxicology Research Centre (ITRC), Lucknow, is developing expertise in this area. Besides test systems for exploring effects in cellular, tissue and whole organisms, seed and pollen germination has been used to map phytotoxic effects.

The effect of endosulfan, a cyclodiene insecticide used extensively in the control of pests in cotton, on *Cicer arietinum* (Bengal gram, chick pea) germinating under standard conditions has been studied. The factors studied were break of dormancy, mobilization of food reserves, and turnover of the auxin indolyl-3-acetic acid. Besides inhibiting dormancy break, the insecticide adversely affected the growth of roots and shoots. Early effects were reversed when exposure to the insecticide was withdrawn. Seedlings tolerated up to 10 ppm of the compound but at the expense of their growth, reflected in lowered hydrolysis of reserve food materials and their translocation. There was rapid uptake

of the insecticide by roots but very little was transported to shoots. The ratio of α/β endosulfan in roots increased with germination.

There was depletion of indole-3-acetic acid. In parallel experiments, interaction of endosulfan with indole-3-acetic acid was demonstrated in the standard barley coleoptile assay. There was a significant inhibition of peroxidase activity in seedlings the growth of which was inhibited by endosulfan. The profile of isoenzymes of peroxidase showed a differential pattern in the control and treated seedlings.

Part of the above work formed the subject of a thesis submitted to the Lucknow University by Kum. Sarita Agarwal, a CSIR research fellow, who has been awarded Ph.D. degree for the thesis. The study was supervised by Dr C.R. Krishna Murti and Dr M.U. Beg of ITRC and Dr C.P. Tewari of the Lucknow University. □

PERSONNEL NEWS

Dr A.R. Verma lays down office

Dr Ajit Ram Verma, Director, National Physical Laboratory (NPL), New Delhi, laid down office on 31 March 1982 after a distinguished career.

Heading NPL for over 17 years since 26 May 1965, Dr Verma has had a



singular distinction of making this premier CSIR laboratory resonate to the fast-changing world trends in physical research—a no mean task considering that he had had to guide its destiny following, though not immediately, his illustrious professor and predecessor Prof. K.S. Krishnan.

Dr Verma took over NPL in mid-sixties, a time when CSIR's direction started focusing more on applied research. Basically a fundamental scientist with roots in university soil, Dr Verma faced a challenging task in gearing up his laboratory to respond to national needs through R&D without dimming the focus on basic research—the thread which weaves into the fabric of technology. NPL's accomplishments over the past seventeen years stand testimony to his R&D managerial capability also. It would not be possible, neither is it necessary, to review even briefly the progress of this large CSIR constituent under Dr Verma's stewardship. Yet a few instances of its accomplishments must needs be highlighted if only to illustrate the impact of its research results on national development and economy. For example, the Central Electronics Limited of the Department of Science and Technology, which produces a myriad electronics components and materials, is a case in point. Owing its origin primarily to the vision of Dr Verma and his laboratory, this perhaps is the first instance of a public sector industry coming up to assimilate the results of R&D from a research laboratory in India. Carbon products industry, which produces a host of materials and components starting with cinema arc carbons in the country, owes again a great deal to NPL.

That NPL plays in India a role similar to that played by the National Bureau of Standards in USA is perhaps not so well known. In the establishment, custody and maintenance of national standards of physical measurements and in providing calibration services at the highest level of accuracy, NPL's achievement merits mention. More significantly, the laboratory in this statutory responsibility has, during Dr Verma's tenure, moved far—replacing concepts based on classical physics to those of quantum phenomena: standards of length, time and direct-current voltage, for example, now maintained at

NPL are quantum phenomena-based. Furthermore, NPL has played a very major role in providing collaboration in metrology among the countries of the Asia-Pacific region.

Reviving NPL's interest and efforts in the harnessing of solar energy is yet another area which testifies to the scientific vision of Dr Verma and his senior colleagues. Whereas in the earlier years NPL had concentrated on developing domestic devices, its emphasis has now shifted, in tune with trends elsewhere in the world, to the development of not only low-cost devices and systems based on thermal conversion but also photovoltaic conversion as exemplified by polycrystalline silicon solar cells and CdS-Cu₂S solar cells.

Cryogenics, superconductivity, vacuum and high-pressure technologies and composite fibres are but a few other fields where NPL's successes have attracted international attention, not to mention the exploration of the properties of the troposphere and the ionosphere, the use of radio waves in communication, in space science and technology.

Dr Verma's individual contributions in crystallography, before and since he came to NPL, are well known to crystallographers the world over. His researches on growth spirals on the surfaces of vapour-grown silicon carbide crystals are epoch-making and are profusely quoted in the 1953 Nobel Prizewinner Prof. Fritz Zernicke's citation. To Dr Verma's credit stand a research school in polytypism at the University of Delhi and a solid-state physics research group dealing with the atomic structure of polytypes at the Banaras Hindu University. At NPL also, where he pursued his research interest on crystal growth and lattice imperfections, he has established a strong group.

A fellow of Indian National Science Academy and of many other learned societies, Dr Verma has won this year's Republic Day Award *Padma Bhushan*.

Himself a recipient of the Shanti Swarup Bhatnagar Prize, Dr Verma has made a handsome contribution to the winners of this coveted prize in science and technology, which few may, but all sharing prizewinners ought gratefully to, remember. For it was he—an invariant thanksgiver at the prize-awarding ceremony—who made the suggestion at the time of presentation of the 1980 prizes in the presence of the Prime Minister, and President of CSIR, Smt Indira Gandhi that the prize but not the prize money may be shared. So it is that subsequent prizewinners even if they share the honour in the same discipline get a handsome Rs 20,000 each.

Dr Verma has laid down office of director no doubt but his retirement is not a departure or withdrawal from scientific pursuits. He is now embarking on enriching the quality of life by self-fulfilment—by a second career. As a Visiting Professor at the Indian Institute of Technology, New Delhi, in addition to being Scientist Emeritus at NPL, he plans to study Prof. C.V. Raman's unique collection of diamonds with the aid of currently available techniques, which were, obviously, not available at the time of India's Nobelist, to understand imperfections in crystals. □

Dr A.P. Mitra appointed NPL Director

Dr A.P. Mitra, Distinguished Scientist, of the National Physical Laboratory (NPL), New Delhi, has been appointed its Director, consequent upon the



retirement of Dr A.R. Verma. Dr Mitra assumed charge of his new office on 1 April 1982.

With NPL since 1954, Dr Mitra has had a distinguished record of academic and professional achievements. A first class first in M.Sc. (1948) of the Calcutta University, he did his doctoral work with (late) Prof. S.K. Mitra and was awarded the prestigious Premchand Roychand Studentship and the Mouat Gold Medal for his work on 'Ionospheric studies by radio astronomical techniques'.

To Dr Mitra primarily goes the credit for the development in Australia of the now-famous cosmic radio noise technique. He worked as a Visiting Professor in the Pennsylvania State University, USA, until 1954.

Dr Mitra initiated radio and space research in NPL, and the Radio Science Division under his leadership has done pioneering work in a number of fundamental and applied areas.

A fellow of the Indian National Science Academy and a member of the International Academy of Astronautics, Dr Mitra is also recipient of the 1968 Shanti Swarup Bhatnagar Prize in physical sciences and the Jawaharlal Nehru Fellowship (1978-80). He is on a number of national and international committees and is currently chairman of the scientific advisory committee of the Indian Middle Atmosphere Programme and a vice president of the International Union of Radio Science. He is on the editorial boards of a number of national and international journals and has authored a number of books and documents and about 200 original scientific papers.

Dr Mitra's contributions in ionospheric physics, particularly on ion and neutral chemistry in the upper atmosphere and on the ionospheric effects of solar flares, have had profound impact internationally. His recent efforts have successfully led to the recognition of the crucial role that some of the minor constituents, especially ozone and nitric oxide, play on our environment. He has been a guiding force in shaping India's scientific research programmes in upper atmospheric physics and related areas.

For a more detailed account of Dr Mitra's scientific and professional attainments, see CN, 24 (1974), 129. □

Dr D.N. Misra

Dr D.N. Misra, Joint Educational Adviser and *ex-officio* Joint Secretary in the Ministry of Education, has been appointed Adviser (M) at CSIR Headquarters, New Delhi (1 April 1982).

Dr Misra started his career, following a brilliant academic record, as a lecturer



in mathematics at Lucknow University in 1951. In 1953 he went to Sorbonne, Paris, for higher studies in mathematics and obtained his doctorate. Returning to Lucknow University, he joined Punjabi University, Patiala, in 1966 as Reader and shifted to University of Sagar as Professor of Mathematics in 1967.

Dr Misra's research interests are in generalized quasi-analyticity and closure theorems, and topology. Six students have obtained their Ph.D. degrees under his supervision.

During his tenure with the Ministry of Education, Dr Misra was in charge of international cultural relations. He was the leader of many Indian delegations for finalizing bilateral cultural exchange programmes with several countries including USSR, Poland, Bulgaria, Czechoslovakia, France, Italy, Mexico, Algeria and Kenya. Dr Misra is currently president of the Delhi chapter of Mathematics Association of India and vice president of Society of Mathematical Sciences (University of Delhi). He was a member of the organizing committee of the international seminar on Algebra and

Related Topics held at Indian Institute of Technology, Delhi, in December 1981. □

Honoures & Awards

RRL-Hyderabad scientists win OTAI awards

Dr M. Sundara Ramaiah and Dr N. Krishnamurti of the Regional Research Laboratory (RRL), Hyderabad, have won the awards of Oil Technologists' Association of India (OTAI) for 1981.



Dr Ramaiah



Dr Krishnamurti

The awards were presented to the recipients at the association's annual convention held on 13 February 1982 at Harcourt Butler Technological Institute, Kanpur.

Dr Sundara Ramaiah wins Dr S. Husain Zaheer Memorial Award, which includes a citation and a gold medal or a cash of Rs 2500, for excellence in research contributions in oil chemistry and technology and allied subjects during 1978-80. He has done commendable work on microvoid coatings from blends of cross-linkable polymers like alkyds and thermoplastic resins like vinylite, chlorinated rubber, and cellulose nitrate. He has made significant contributions to the advancement of science of surface coatings by preparing opaque coatings without the use of pigments. He has also studied thermal stability of the microvoid coatings.

Dr Krishnamurti wins the R.B.G.V. Swaika Memorial Award, which includes a citation and a gold medal or a cash of Rs 1000, for excellence in process/product development in oils, oilseeds, surface coatings and allied industries during 1978-80. He has developed primers and top-coat paints

based on water-soluble epoxy resin drying oil fatty acid esters which are suitable for coating by electrodeposition method. He has worked on other water-soluble vehicle systems and other modifications of epoxy-polyester resins. His work is of great practical utility in the surface-coating industry. □

Retirements

Shri S. Banerji, Member-Secretary, International Hydrological Programme, retired on 31 March 1982. □

PATENTS FILED

720/Del/81: An improved process for the electrodeposition of lead dioxide on titanium substrates. H.V.K. Udupa, N. Thiagarajan, K.C. Narasimhan, M. Nagalingam, M. Sadagopalan, S. Pushpavanam, R. Palanisamy, N.S. Raghavendran & V. Rengarajan Central Electrochemical Research Institute, Karaikudi.

723/Del/81: Improved process for casting of aluminium or aluminium alloys to obtain fine grain refining thereof. R. Kumar, C.S. Sivaramakrishnan & R.K. Mahanti National Metallurgical Laboratory, Jamshedpur. □

ANNOUNCEMENTS

CECRI Training Courses and Research & Industry Get-together

The Central Electrochemical Research Institute (CECRI), Karaikudi, will conduct refresher courses on Electroplating (2 June - 10 Aug. 1982); Corrosion and its Prevention (15 Sep. - 19 Oct. 1982), Storage Battery Technology (25 Oct. - 18 Dec. 1982).

CECRI will also be holding a one-day get-together with industry to assess the R&D needs of the country with regard to corrosion inhibitors; it is scheduled for 4 June 1982 at the CSIR Complex, Madras. The get-together will discuss the indigenous availability of raw materials; utilization of natural resources; and specifications and testing

facilities relating to these inhibitors. CECRI scientists will present their work on vapour phase inhibitors, cooling water inhibitors, acid inhibitors, and inhibitors for automobile radiators and for concrete. Studies made at the Defence Research Laboratory (Materials & Stores), Kanpur, the National Metallurgical Laboratory, Jamshedpur, and the Indian Institute of Petroleum, Dehra Dun, will also be presented.

Industries desirous of sponsoring their candidates to the courses, or interested in participating in the get-together, should contact the Director, Central Electrochemical Research Institute, Karaikudi 623 006. □

NOMINATIONS INVITED

Coal Scientists Awards 1981

Nominations are invited by the Central Fuel Research Institute (CFRI), Dhanbad, on behalf of the Union Ministry of Energy and Coal (Department of Coal) for two awards to be given for meritorious research in coal science and technology. One of these, Senior Coal Scientist Award, carrying a cash prize of Rs 5000 and a gold medal, is open to all research, development and technological personnel connected with coal science and its utilization. The second, Junior Coal Scientist Award, carries a cash prize and a medal and is restricted to personnel in similar fields but below the age of 40 on first January of the year for which the award is made.

Each nomination (10 copies) should be accompanied by a detailed statement of work and attainment of the nominee and a critical assessment in not more than 500 words bringing out the importance of the significant research and development contributions of the nominee made during 5 years preceding the year of the award.

Nominations should be sent in sealed cover to the Director, Central Fuel Research Institute, P.O. FRI, Dhanbad 828108 on or before 31 May 1982, from whom further details as well as proforma may be obtained. □



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RRL-Hyderabad wins FICCI Award

The Regional Research Laboratory (RRL), Hyderabad, has won the institutional award for 'research in science and technology' for the year 1981 of the Federation of Indian Chambers of Commerce & Industry (FICCI). This laboratory shares this award with Sir Padampat Research Centre, Kota.

Dr G. Thyagarajan, RRL's Director, received the award from Shri Pranab Mukherjee, Union Finance Minister, at the 55th annual meeting of FICCI held in New Delhi, on 27 March 1982. The award comprises a plaque and a citation.

Highlighting the valuable contribution this laboratory has made for the growth of industries over the years, the citation recognizes the capabilities of the laboratory in research, development and design in several areas of technology, transfer of which called for expertise in various aspects such as pilot plant trials, design engineering, technical assistance and consultancy, all of which have left a significant impact on indigenous technology. Particular mention is made of the project on the low-temperature carbonization (LTC) of coal, which has been cited as a 'project of national importance'.

The laboratory has successfully transferred its LTC technology to Singareni Collieries Ltd, who have commissioned a 900 tonnes per day plant for carbonization of non-coking coals at Naspur, Adilabad Dist., Andhra Pradesh. This is perhaps the single largest, investmentwise, of the CSIR processes released and commercialized.

The process know-how package included basic engineering and detailed design of critical equipment. The project engineering was done by Engineering Projects (India) Ltd. The plant, built at a cost of Rs 130 million, did not involve any out-go of foreign exchange at any stage. Currently, this regional laboratory has a major programme of work in coal gasification.

In the area of organic chemicals and intermediates, the anti-inflammatory drug Tromaril, discovered by this laboratory, is being successfully marketed by Unichem Laboratories, Bombay. Methaqualone, the first non-barbiturate hypnotic drug to be synthesized, was also a product of this laboratory.

Two tranquillizers, chlordiazepoxide and diazepam, are under production by Ranbaxy Laboratories; also Clofibrate, a drug for reducing cholesterol, is being commercially produced. A full range of benzyl chemicals based on this laboratory's processes is being produced in the country. Know-hows for the manufacture of important pesticides such as Monocrotophos, Quinalphos, Diazinon and DDVP have been developed and transferred to industry—pieces of work which have won for this laboratory a pride of place as one of the leading centres of pesticide R&D work in the country.

Similarly, contributions to chemical industry have come from inorganic chemistry and surface coating disciplines. There is a great demand for the processes on agro- and forest-based products. It is to this laboratory's credit that a sizeable part of its work is

sponsored by industry in both the private sector and the public sector. Based on the successful performance of the 1 tonne per day prototype plant, Gujarat State Fertiliser Co. Ltd (GSFC), Vadodara, has decided to use indigenously manufactured RRL catalyst in place of imported ones for converting benzene to cyclohexane, an intermediate in the production of caprolactam, which in turn is required for manufacturing nylon.

Likewise, GSFC has been assisted in improving the yield of ammonia by computer simulation. Apart from basic research in computer use, the laboratory has a fourth-generation computer which is being utilized to optimize the working parameters for real-time control of processes. Data for upscaling bench-scale data to pilot plant level and beyond have been successfully provided. □

National Seminar on Patents System

A national seminar on Patents System held at the Regional Research Laboratory, Hyderabad, discussed ways and means to improve the management of patent grants by the Patent Office so as to avoid simultaneous filing and patenting of the same

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technology in multiple patents and to bring about uniformity in guidelines for patent examination at the different branches of the Patent Office. Sponsored, among others, by CSIR, National Research Development Corporation of India and the Department of Science and Technology, the seminar also examined the need for developing patent documentation and patent information retrieval services at national, regional and R&D unit levels and called for a review of the Patent Office set-up.

To make the Patent Law 1970 more effective, the seminar recommended revision/incorporation of certain legislative clauses relating to extension of term of patents, especially those covering drugs and chemicals; early publication and grant of patents by separating the examination procedures in respect of novelty and patentability; share in profits (i.e. royalty, premium, etc.) for inventors/employees; grant of 'utility model patent' and 'author's certificate' for petty models/innovations; combination of patent rights with patent working; and setting up of a patent appeal tribunal.

Patented technology transfer services to industry, the seminar proposed, should be organized in the form of marketing agencies so that technology is not only licensed but is also commercially utilized, by constant follow-up and interaction between competent persons from the industry and the creators of technology; the seminar also called for making flexible the licensing procedure in accordance with the needs of the industry.

Steps to achieve quick publication of the Patent Office Gazette and starting of the proposed patent information centre at Nagpur at an early date were also suggested.

To create patent consciousness among the people, the seminar suggested: introduction of suitable courses on industrial and intellectual property laws at the university level; further expansion of schemes to award scientists, artisans

and skilled workers at the shop-floor level for their inventive efforts; and setting up of inventors' associations and patent professional bodies at national and state levels and providing for their proper interaction with similar international organizations through WIPO, Unesco, and other such bodies.

The seminar felt that the CSIR's Patent Unit should be strengthened to provide more effective service. The importance of having patent expert cells at the laboratory level to involve the research scientists in the identification of patentable inventions at the early

stage of research work was stressed. It was also suggested that the CSIR rules be revised to restore to research workers a share in the royalty and premium on patented technologies by way of incentive.

Attended by about 150 participants, the seminar (28-29 Nov. 1981) was spread over three sessions, viz. role of patents in R&D, patent processing and management, and patent information sources, each involving presentation of a lead paper and several theme papers followed by discussions. In all, about 30 papers were presented. □

Salt & Marine Chemicals

INTERNATIONAL SYMPOSIUM AT CSMCRI

The starting of a postgraduate course under the aegis of the Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, with assistance from UNIDO, and the establishment of marine chemicals complexes at important places in India with CSMCRI's assistance, were two of the most important recommendations made at an international symposium on Salt and Marine Chemicals held at the institute, 4-6 March 1982.

Twenty-two delegates from 15 overseas countries and 242 Indian delegates participated in the symposium at which 60 papers, including five key-note addresses, were presented under five technical sessions. The topics which the symposium covered were: Design and

operation of solar salt-works; Soil stabilization and operation of ponds; Salt technology including salt production from sub-soil brine and lake brine, and mechanization and transportation in solar salt-works; Rock-salt mining and economics; Recovery of marine chemicals—gypsum, bromine and magnesium compounds and potash; Recovery of trace elements; Fish and prawn farming in ponds; Corrosion and pollution of seas; and Energy from ocean.

Shri Sanatbhai Mehta, Gujarat's Planning & Finance Minister, who inaugurated the seminar, remarked that self-reliance in oceanography and marine technology was vital for developing countries. The new techno-



Gujarat's Planning & Finance Minister Shri Sanatbhai Mehta inaugurating the symposium. Seated on the dais (from right): Dr E.R.R. Iyengar, Prof. I.J. Dhruv, Prof. M.M. Taqui Khan, Prof. K.S. Rao, Dr M. Judt, and Dr J.R. Sanghavi

logies evolved should not affect adversely the traditional fishermen and salt makers. Describing the ocean as the lungs of the world, Shri Mehta called for reducing pollution in the oceans. The cooperation in the use of satellites for this purpose was needed for mutual benefit, he added.

In his presidential address, the CSMCRI's Director Prof. M.M. Taqui Khan, gave an overview of the Indian salt industry: 50% of the 9 million tonnes of salt produced in India came from Gujarat; domestic demand for salt was expected to touch 7.8 million tonnes by 1985, and export was expected to go up from the present 0.29 million tonnes to 0.4 million tonnes; and about 1,40,000 acres of saline land were not yet under cultivation. On the basis of 9 million tonnes of salt production, the country could produce 0.18 million tonnes of potassium salts, 1.8 million tonnes of magnesium chloride, 0.45 million tonnes of epsom salt and 18,000 tonnes of bromine. The production of salt, according to Prof. Khan, could also be increased by improving technologies relating to washing, warehousing, transportation, etc.

The CSMCRI's Director also offered to share the Indian expertise in the area with other developing countries.

Dr M. Judt, Senior Industrial Development Officer, UNIDO, thanked Prof. Taqui Khan for the offer of sharing expertise for the benefit of least developed countries.

The symposium was sponsored by CSIR, Hindustan Salts Ltd, Indian Salt Manufacturers' Association (Bombay), Government of Gujarat, Salt Department of the Government of India, University Grants Commission, and UNIDO. □

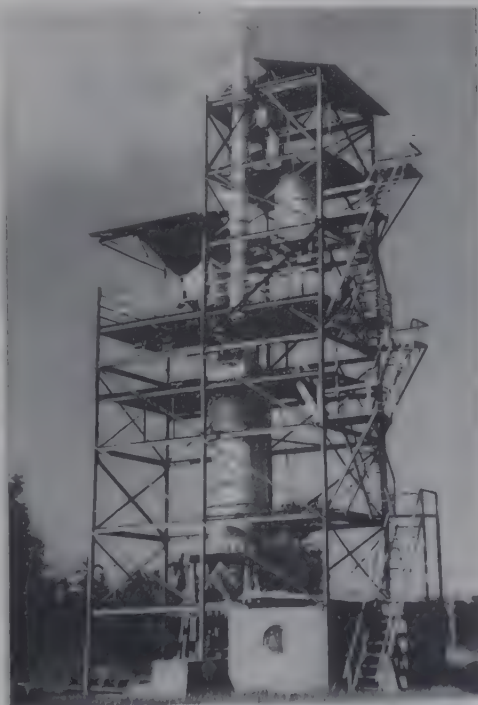
Mini-cement plant based on RRL-Jorhat know-how in commercial production

The mini-cement plant of Kutch Cement (Pvt) Ltd, Bhuj (Gujarat), which utilizes the vertical shaft kiln (VSK) technology developed by the Regional

Research Laboratory (RRL), Jorhat, has gone into commercial production. This is the first mini-cement plant set up in the country that has successfully utilized the VSK technology. Initially, a 2-tonne per day VSK was commissioned by the firm at its premises, with the help of scientists and technicians of the Jorhat laboratory, for demonstration and training. The kiln was also utilized for evaluating the feasibility of using locally available raw materials and for working out a suitable raw meal composition for the 30-tonne per day kiln, now commissioned.

The adoption of shaft kiln plant for the manufacture of cement is well suited under Indian conditions, particularly for utilizing the scattered and limited resources of raw materials which do not warrant the setting up of large-sized conventional plants. The high thermal efficiency and low investment make the process more attractive. Additionally, the establishment of such plants will not only decentralize the production of cement but generate employment avenues in remote and isolated areas.

FACT Engineering & Design Organisation, Cochin, has entered into



*Mini-cement plant (vertical shaft kiln):
demonstration unit at RRL-Jorhat*

a collaborative agreement with the Jorhat laboratory through the National Research Development Corporation of India for offering, on turn-key basis, cement plants of 30 to 100 tonnes per day capacities. The capital investments for plants of 30, 60 and 100 tonnes per day capacities are estimated at Rs 90 lakh, Rs 160 lakh and Rs 240 lakh respectively. The cost of production works out to be about Rs 400 per tonne □

Ion-sensitive electrodes

The Central Electrochemical Research Institute (CECRI), Karaikudi, has developed a method of making cupric, silver and chloride ion-sensitive electrodes, which can be used in water analysis, pollution control and effluent monitoring. Their working is based on the dependence of the potential response of the membrane contained in them to the concentration of the species in solution. These electrodes offer a simple and direct method of monitoring ions at ppm levels.

The CECRI process consists in preparing non-porous membrane discs of suitable diameter and thickness from active materials. The active material is compressed under vacuum at high pressures and the resulting membranes are assembled as electrodes in suitable plastic bodies after providing proper electrical contacts to the membrane.

Capital investment for a plant with a capacity for making 1500 electrodes per annum (500 electrodes of each type) has been estimated at Rs 1.19 lakh. The cost of production works out to be about Rs 135 per electrode, the return on investment being about 335%. □

Calcium halophosphate phosphor

Calcium halophosphate daylight phosphor, which finds application as a coating compound in tube lights, can now be produced by a process developed by the Central Electrochemical Research Institute (CECRI), Karaikudi. The phosphor is made by a solid-state reaction at a high temperature by

using high-purity chemicals of fine particle size. An advantage of the process is that it does away with the use of special inert gas atmospheres.

The steps involved after suitable batch formulation are fine slurry grinding, drying, heating at a high temperature for the solid state reaction, air quenching, and subsequent grinding. The spectral energy distribution and intensities of these phosphor samples are comparable to those of the commercial ones.

Capital investment for a plant with a capacity for producing 3 tonnes per annum of the phosphor has been estimated at Rs 3.8 lakh. The cost of production has been worked out to be Rs 136 per kg, the return on investment being 19%. The estimated demand for this phosphor is about 300 tonnes per annum. □

Monitoring of decentring operation of Asiad's indoor stadium roof

The Central Road Research Institute (CRRI), New Delhi, has recently completed an assignment involving monitoring, deflections and stresses during the decentring of the main roof structure of the indoor stadium under construction for IX Asian Games. The job was assigned to CRRI by the Delhi Development Authority.

The roof (diam. 150 m) is designed to rest on eight RCC pylons. Because of the large span, twelve intermediate supports were used for erecting the lotus-shaped roof. During the decentring operation, all the intermediate supports were removed so that the roof finally rested over the eight designated support positions on the pylons. During the process of decentring, it was found that the travel left in the four central jacks was only 10 mm, and that the other eight supports had by then become free of the roof system. As the atmospheric temperature was below the expected value, the structure was hugging the jacks and the travel left in the four jacks was inadequate for completely freeing

the roof system from its supporting jacks. The decentring operation by now had gone beyond its scheduled time of completion and it was necessary to make adjustments in all the four jacks—a procedure which would have required about eight hours.

The expert guidance provided by the CRRI team made it possible to increase the travel of jacks to 100 mm in a record time of 1½ hours, and the decentring operation could be completed 6 hours ahead of the anticipated time. □

Immobilized enzyme product for use in leather industry

A new immobilized pancreatic enzyme product for bating and unhairing of leather has been developed at the Central Leather Research Institute (CLRI), Madras. The researcher, Shri R. Puvanakrishnan, carried out the work under the guidance of Dr S.M. Bose of CLRI's biochemistry laboratory.

The product has been prepared by immobilization of activated pancreatic enzymes on sand by using a bifunctional agent, glutaraldehyde. A new bating process for the manufacture of glaze kid and a method of enzymatic unhairing of sheep skins have been developed by utilizing this product. The product can be reused up to as many as three times. In conventional techniques, soluble enzymes which cannot be reused are employed in bating and unhairing processes.

The proteolytic enzymes which are normally used in bating and unhairing operations are alkaline as well as acidic in nature. Hence, two types of proteolytic enzymes, viz. trypsin and pepsin, having distinctly different pH optima were immobilized on sand and the properties of the immobilized enzymes, viz. pH stability, thermal stability, storage stability and stability towards denaturing agents, were studied in detail in comparison with those of the native enzymes. A maximum retained activity of 94.5% was observed for trypsin immobilized on sand via 3-

aminopropyltriethoxysilane (APTS) and glutaraldehyde. In the case of pepsin bound to sand through APTS and 1-ethyl-3-(3-dimethylamino-propyl)-carbodiimide HCl, a maximum retained activity of 60.8% was obtained.

The researcher has also suggested a possible mechanism of immobilization of trypsin on sand.

Shri Puvanakrishnan has been awarded Ph.D. degree (1981) by the University of Madras for his thesis based on the studies. □

Tensile behaviour of collagenous tissues

The mechanical properties of tensile, pliant and rigid collagenous tissues have been studied by Shri A. Rajaram of the Central Leather Research Institute (CLRI), Madras. Elastoidin fibres from the fin of sharks represented the tensile, ray fish skin and bovine scapula cartilage the pliant, and antler bone and ray fish dentine (from its caudal spine) the rigid tissues considered for the study.

Elastoidin exhibited properties which were quite different from those of tendon. This difference could be attributed to the higher content of non-collagenous protein in elastoidin. In the hydrated condition, the former exhibited lesser strength than tendon fibres but, in the anhydrous state (65% RH), it exhibited high tensile strength. The mode of fracture was also different in dry and wet states. Elastoidin was stiffer than tendon and did not exhibit the crimped structure shown by tendon fibres. Elastoidin fibres, it is inferred, probably serve to augment the stiffness of shark fins which have cartilaginous rays. Scanning electron microscopic observations of elastoidin showed the presence of fibre elements arranged in non-uniform lamellae.

Ray fish skin exhibited mechanical properties which were somewhat different from those of mammalian skin. This could be attributed to the arrangement of collagen fibres in the

fish skin, which were found to be in an orthogonal pattern on the dorsal side of the fish and in an axial direction on its ventral side. In mammalian skin, usually collagen fibres are in a three-dimensional array even though there is a predominant direction of collagen fibre-weave in the direction of higher stress. The ventral skin of the ray fish exhibited higher strength in a direction parallel to the body axis and high stretchability in the orthogonal direction. Even on the dorsal side the strength was more in the axial direction. The mechanical properties and arrangement of collagen seem to be a result of the functional demands on the skin.

The collagen layer of scapula cartilage appeared to be in the form of prestress. The association of collagen with the gel matrix resulted in faster relaxation of stress, especially at the surface layers of the cartilage in contact with the neighbouring tissue. The predominant direction of collagen fibres on the surface of the scapula cartilage suggests that there are definite force trajectories on the surface when the forelimbs are in flexion or abduction.

Antler bone was found to have a modulus lower than that of bovine bone and it also exhibited plastic flow before fracture when tested 'dry' or 'wet'. Bovine bone is known to exhibit plastic flow only when tested wet. Antler bone underwent comparatively larger extension before fracture. Its strength was comparable to that of bovine bone as it contains only primary osteons. The differences in properties of antler bone might be due to its low degree of mineralization brought about by the fast rate of growth.

Ray fish dentine from its caudal spine was similar to the normal bone in its mechanical properties. It had high strength, a high modulus and its mode of fracture also resembled that of mammalian bone. Its chemical composition and structure were similar to those of bovine bone—features which might explain their similarities in tensile properties.

Shri Rajaram, who carried out the study under Dr N. Ramanathan, was awarded Ph.D. degree (1981) by Madras University for his thesis based on the studies. □

Serological testing in amoebiasis with auxenic *Entamoeba histolytica* antigen

Amoebiasis is a serious health problem in most of the tropical and some of the temperate countries of the world. In a study carried out at the Central Drug Research Institute (CDRI), Lucknow, intensive examination of stool by three complementary techniques, viz. fresh smear in normal saline and Lugol's iodine, permanent smear stained with iron hematoxylin, and zinc sulphate flotation, revealed the presence of *E. histolytica* in 10.9% of 688 cases of gastrointestinal disorders. Other parasites encountered were *Escherichia coli* (23.6%), *G. lamblia* (13.1%), *Ascaris lumbricoides* (8.7%), hookworm (6.5%), and *H. nana* (2.4%).

Because of the inherent difficulties of microscopic examination of stool samples, possible use of serological techniques for diagnosis of amoebiasis has been stressed. Improved techniques of axenic cultivation of *E. histolytica* at CDRI have made possible the development of standard amoeba antigen. By using this antigen, indirect haemagglutination test (IHA) has been developed for detection of coproantibodies in stool samples. This test yielded positive results in 11.45% of the 688 cases of gastrointestinal disorders examined. This is in close agreement with the number of *E. histolytica*-positive stool cases. Standardization of IHA test using glutaraldehyde-treated sheep erythrocytes eliminated the variations in batch-to-batch differences in the properties of erythrocytes. This test was positive for 71.25% among cases of intestinal amoebiasis and only 5.1% for non-amoebic cases.

Serum collected from patients suffering from different types of amoebiasis—amoebic liver abscess (bacteriologically

sterile anchovy sauce pus) (Gr. I), amoebic dysentery (*E. histolytica*-positive stool) (Gr. II), and amoebic dysentery with tender hepatomegaly (*E. histolytica* - positive stool) (Gr. III) were analyzed for the presence of specific antibodies. Serum samples from normal healthy subjects (Gr. IV), random hospital cases (Gr. V), and cases of tender hepatomegaly (all negative for *E. histolytica* in stools) (Gr. VI) were included as controls. Serological tests employed were IHA, indirect fluorescent antibody (IFA) test, gel diffusion precipitin (GDP) test, immunoelectrophoresis (IEP), and countercurrent immunoelectrophoresis (CIEP) test. IHA test was positive in all cases of Gr. I and 77.7%, 72.5%, 2.3%, 3.0% and 9.4% respectively in the other groups. IFA was positive in all cases of Gr. I and 77.7%, 63.6%, 4.4%, 6.0% and 7.8% respectively in other groups. Identical results were obtained in GDP and CIEP. The latter test, however, has the advantage of yielding results in 60 min. These tests were highly specific as none of the control groups IV and V gave positive reactions and only 2.6% cases of Gr. VI gave a single precipitin bond. These tests were positive in all cases of Gr. I and rather low, i.e. 22.2% for Gr. II and 9.1% for Gr. III.

The tests could be valuable in differential diagnosis of amoebic liver abscess from other conditions of tender hepatomegaly, such as pyogenic liver abscess, hepatoma, and secondary carcinoma of liver, and for differentiating acute amoebic colitis from non-specific chronic ulcerative colitis.

The studies were carried out by Shri Pawan Sharma under the guidance of Dr G.P. Dutta of CDRI. Shri Sharma was awarded Ph.D. degree by the Panjab University, Chandigarh, for his thesis based on the studies. □

Prof. Nurul Hasan delivers foundation day lecture at RRL-Jorhat

Prof. S. Nurul Hasan, CSIR's Vice President, delivered the fifth foun-

dation day lecture at the Regional Research Laboratory (RRL), Jorhat, on 27 February 1982. He also handed over this regional laboratory's technology package on chloroquine phosphate to Bengal Immunity Co. Ltd (BICL), Calcutta.

In his address, Prof. Nurul Hasan called upon the scientists and technologists to find ways and means of establishing a self-reliant and egalitarian society with the help of science and technology. He appealed to the scientists to find solutions to the burning problems of the nation, like explosive population growth, shortage of houses, cloth, paper, etc. on the one hand and the dwindling reserves of natural resources on the other. He made a pointed pitch for providing drinking water in villages.

The CSIR's Vice President congratulated the RRL-Jorhat scientists for their work on the antimalarial drug whose basic design package he handed over to Bengal Immunity Co. He noted with satisfaction this CSIR's constituent's work in another collaborative project on Chlorfenvinphos, which was successfully executed for National Organic Chemical Industries Ltd, Bombay. Citing this and other events from history, he said that the notion of Indians not being good at collaborative work was unfounded. He also reminded the scientists of this laboratory of their responsibility towards the people of the region in particular and of the nation in general.

Earlier, Dr J.N. Baruah, the Director, gave details of the chloroquine phosphate project. Shri H.S. Dubey, Lt. Governor of Arunachal Pradesh, who presided over the function, urged the scientists to also tackle such problems as providing proper science education and development of entrepreneurship talents among the people of the region. □

PROGRESS REPORTS

CFRI Annual Report 1980-81

The Central Fuel Research Institute (CFRI), Dhanbad, according to its

annual report for 1980-81 published recently, investigated 130 sub-projects under 40 projects during the year; 11 of these were sponsored ones. Based on CFRI's technologies a plant for the production of β -naphthol and a paddy husk combustor went on stream. Four processes relating to anthracene purification, anthraquinone production, briquetting with inorganic binder, and a new beehive oven were licensed to entrepreneurs.

Beneficiation studies of feed coals of three new washeries of the Bharat Coking Coal Ltd (BCCL) at Barora No. 2, Bhalgora and Pootkee were completed and feasibility reports indicating the proposed scheme worked out by the laboratory were submitted to the sponsor.

A 100 kg per hr continuous oil agglomeration unit was set up and commissioned at CFRI. Operating conditions of the unit were standardized by using the slurry and middlings samples from Patherdih and Lodna washeries. With some additives, reduction in oil consumption, from 10 to 6%, could be achieved in the case of slurry. Based on a feasibility report for a 10-tonne per hr demonstration plant prepared by the institute and submitted to BCCL/CCWO, BCCL initiated action for installing a demonstration plant at Patherdih washery.

Substantial reduction in the alkali consumption in the chemical demineralization of coal was achieved. Techno-economic feasibility studies on the demineralization process were made at varying plant capacities from 30 to 200 tonnes/hr. Even in the small plant, where byproduct recovery was to the extent of 80%, the cost of 5% ash coal worked out to only Rs 380 per tonne.

A report on the preparation of domestic briquetted fuel from non-coking coals of Bogra was submitted to the Central Mine Planning & Design Institute (CMPDI), Ranchi. Briquetting studies of Lalmatia coals (Rajmahal coalfields) were completed for CMPDI. Satisfactory domestic fuel could be

prepared, by using pelletization technique, from coals of Tipong colliery of Assam.

A series of pilot plant coking tests with Karo Special Seam coal (East Bokaro coalfield) were completed. Possibilities of replacing the washed medium coking coals used in Bokaro Steel Plant with raw coal from Karo Special Seam were examined on behalf of Central Coalfields Ltd. Carbonization tests with blends of washed coals of Topa and Pindra collieries, and VI, VII and VIII seams from West Bokaro coalfields were completed and a report was being prepared.

In collaboration with Steel Authority of India Ltd and Bhilai Steel Plant, a major project was being pursued on identification of optimum coal blends for Bhilai Steel Plant and development of technology of their preparation by selective crushing using pneumatic classification technique. A 225 kg capacity electrically heated test coke oven, imported from UK, was commissioned for carrying out blending tests. The pneumatic separation unit designed by the laboratory was also incorporated in the system. Analytical tests were done on samples from imported coking coals to be used in steel plants.

The design of a two-stage (100 kg per hr) utility producer gas unit for use in small-scale industrial heating was completed. In connection with the setting up of a two-stage fluid-bed gasifier for production of fuel gas using undersize coal, the carbonizer and gasifier systems were completed. Trial runs were conducted in cold condition for flow measurement and pressure testing.

Work on unsupported and disposable catalyst for hydrogenation of coals was completed. Studies on characterization of coal hydrogenation products by different techniques were being continued. Work was completed on the techniques of production of petroleum coke and its substitute.

A 660-tonne per year β -naphthol plant (Rs 13 million), based on CFRI's

know-how for conversion of byproduct naphthalene of coke ovens, was put on stream in Bokaro.

A process was developed for removal of impurities such as water, tar acids and neutral oil from crude pyridine to meet the specifications of dyestuff industries.

Two types of molecular sieves for use in the separation of different constituents present in gas mixture, specially in the petroleum industries, were developed. These sieves can replace more than 50% of the catalysts used in the processing of petroleum.

A techno-economic evaluation report on anthracene-anthraquinone process was prepared for a licensee. Trial runs were continued with the 15 kg per batch cresol pilot plant set up at the institute.

Studies on the solvent refining of Kutch lignite were completed. The maximum total conversion attained was about 94% at 94°C under a hydrogen pressure of 100-110 kg/cm² for a residence time of 2 hr. The solvent-refined lignite was found to be highly caking, the caking index being 32-34. It was established that separation of insolubles (including mineral water) was not necessary for imparting caking characteristics.

A coal-oil non-settling slurry, designated as Carboil, was developed by using bituminous coal/lignite (<20% ash) and anthracene oil/fuel oil, with additives under particular process conditions.

Nitric acid requirements for the CFRI-developed coal acid fertilizer was reduced from 7:1 of nitric acid-to-coal, as required in the earlier technique, to 1:1. Field trials on combination fertilizers (ammonium sulphate or urea containing 10-15% of coal acids) were carried out at three places to find the increase in nitrogen utilization efficiency over conventional fertilizers.

Work carried out under the Resource Quality Assessment Programme at the seven coal survey units covered investigations on 35 coalfields. Under exploration by drilling, over 1100 boreholes drilled in 110 blocks were

studied, comprising a total core length of 21,500 m, and analysis of 45,000 samples in all. In addition, work was continued on physical and chemical survey of coals from working collieries, including laboratory-scale beneficiation tests, as aid to industry and the Railways. The value of the work done gratis for CMPDI was estimated at Rs 245 million.

Fifty-seven research papers were published and four patents filed. □

Course on Basic Metallurgy

A short-term course on Basic Metallurgy for the inspecting engineers of the Indian Railways was conducted by the National Metallurgical Laboratory (NML), Jamshedpur, from 23 February to 5 March 1982. Participants in the course, formulated at the request of Rail India Technical and Economic Services Ltd, Calcutta, were drawn from railway workshops; Research, Design and Standards Organisation; Chittaranjan Locomotive Works; and other organizations.

The course covered: structure and solidification of metals, mechanical deformation and testing, heat treatment of metals and alloys, optical metallography, cast irons, non-ferrous metals and alloys, welding, foundry practice, corrosion and its prevention, and nondestructive testing techniques. □

Minerals and biomaterials laboratories inaugurated at RRL-Trivandrum

Prof. S. Nurul Hasan, Vice President, Council of Scientific & Industrial Research, inaugurated the mineral processing laboratory and the biomaterials processing laboratory of the Regional Research Laboratory (RRL), Trivandrum, on 14 April 1982. The two laboratories have facilities for carrying out studies in food-processing, spices technology, mineral-processing, properties of materials, beneficiation of clay, etc.

The Vice President, in his address to the staff, stressed the need for choosing

such projects as would contribute significantly to raising the living standards of the common man. While selecting projects that would have a good economic impact, care should be taken to do fundamental research also in the areas of thrust in order to keep abreast of the recent developments, Prof. Hasan added. □

PERSONNEL NEWS

Appointments/Promotions

Shri V. Raman

Shri V. Raman has been appointed, on promotion, Scientist F at the National Environmental Engineering Research Institute (NEERI), Nagpur (28 Dec. 1981). He is at present heading the Water Distribution Cell and Sewage Treatment and Environmental Engineering Consultancy divisions.

Shri Raman (born 19 June 1932) obtained his bachelor's degree in civil



engineering from IIT-Kharagpur, master's degree (1957) in public health engineering from Madras University, and diploma (1964) in industrial hygiene from University of Zagreb, Yugoslavia.

Prior to joining NEERI, Shri Raman was Assistant Professor of Sanitary Engineering at All India Institute of Hygiene and Public Health, Calcutta (1957-70). He joined NEERI as Scientist in charge of its zonal laboratory at Bombay, where he planned and implemented projects on water supply and wastewater disposal in connection with the preparation of master plan of Greater Bombay and air pollution survey of Greater Bombay and New

Bombay. During 1975-77, he headed Rural Sanitation and Sewage Treatment divisions.

Shri Raman has specialized in storm water hydrology and maintenance of water distribution systems. He has been responsible for the development of an indigenous small-scale electric network analyzer, an anaerobic (upflow) filter and a rotating biological contactor for treatment of sewage and/or septic tank effluents. He has also carried out feasibility studies on utilization of wastewaters of Bombay and Mathura refineries.

Shri Raman has held short-term consultancy assignments under WHO, UNIDO and UNEP auspices in Iraq, Sri Lanka and Bangladesh to advise on water supply, waste disposal, and environmental impact analysis. He has served on two task force committees on environmental appraisal constituted by Department of Environment/Science and Technology and is on several ISI committees. Has 70 publications to his credit.

Dr E.R.R. Iyengar

Dr E.R.R. Iyengar of the Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, has been promoted as Scientist EII (4 March 1982).

Dr Iyengar (born 25 Oct. 1935) had his early education in Bangalore and obtained M.Sc. (Agri.) and Ph.D. in plant physiology in 1959 and 1968 respectively from the Banaras Hindu University. After working for a short while with the Government of Mysore, Dr Iyengar joined CSMCRI where he started research in using sea-water and coastal soils, including dune sand, for growing crops and plants. He was for some time with the Indian Council of Agricultural Research on deputation.

A specialist in biosalinity research, Dr Iyengar has contributed to the understanding of the physiological and biochemical basis of genotypic variations of plant varieties to salinity of sea-water and has successfully induced

plants to higher salinity tolerance to take direct application of sea-water. His current research interests include growing exotic species of plants under a biosaline environment for industrial applications and exploration of the possibilities of the use of halophytes as a source of fibre, chemicals and fodder additives.

Deputed to Japan under Colombo Plan in 1975, Dr Iyengar has also visited USA and Mexico as an invitee of the National Science Foundation, USA, to present lead papers at the International Workshops on Biosaline Research in 1977 and 1980.

Dr Iyengar has published more than 52 papers and a few monographs. A member of Sand Dune Research Association, Japan, he was awarded the Governor's plaque, Miyazaki Prefecture, for his lecture at the 22nd annual convention of the Association in 1975.

Transfers

Shri B.N. Sahai has joined the Publications & Information Directorate, New Delhi, as Administrative Officer on transfer from the Central Building Research Institute, Roorkee (26 April 1982).

Retirements

Dr M.N. Moorjani, project coordinator of Meat, Fish & Poultry Technology Discipline of Central Food Technological Research Institute, Mysore, retired in February 1982 after 35 years of service with CSIR. He has visited Australia, West Germany, Scotland and some Asian countries. Has published 80 research papers.

OBITUARY

Shri B. Anandaswamy of the Central Food Technological Research Institute (CFTRI), Mysore, passed away on 11 March 1982.

Shri Anandaswamy, who joined CFTRI in 1951, held the position of

project coordinator of CFTRI's Packaging Technology Discipline since 1974. He had visited Hungary and West Germany and was a member of various ISI committees. He had published more than 50 research papers.

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

The Council of Scientific & Industrial Research proposes to appoint Scientists F in its various constituent laboratories. The respective discipline/area and the CSIR constituent laboratory as also the deadline for sending *curriculum vitae* are as follows:

Advt. No. 25/82: Biochemistry and microbiology, Regional Research Laboratory, Jorhat—27 May 1982.

Advt. No. 27/82: Biochemistry, Central Drug Research Institute, Lucknow—9 June 1982.

Advt. No. 28/82: Civil/structural engineering, Structural Engineering Research Centre, Roorkee—9 June 1982.

Advt. No. 29/82: (two posts) (i) Optical instrumentation, and (ii) Electronic instrumentation (e.g. data processing systems and programmable digital testing systems), Central Scientific Instruments Organisation, Chandigarh—15 June 1982.

Advt. No. 32/82: Mass spectroscopy, Regional Research Laboratory, Hyderabad—8 July 1982.

The pay scale for these posts is Rs 2000-125/2-2500 plus allowances at the Central Government rates. Prescribed forms for sending the *curriculum vitae* are obtainable from the Chief (Administration), Council of Scientific & Industrial Research, New Delhi 110001, from whom further details regarding the above posts may also be obtained.

Addendum to Advertisement No. 21 82

With reference to the advertisement for the post of Director, Central Building Research Institute, Roorkee [see CN, 22(1982), 56], scientists/technologists possessing qualifications mentioned below, in addition to those mentioned earlier, will also be eligible:

High academic qualifications in building science with sufficient experience of research and development in one or more of the following areas: Building materials, Foundation engineering, Soil mechanics, Architectural and physical planning, Rural buildings and environment, Fire research, Building plants, Building physics, and Management of construction.

The last date for receipt of *curriculum vitae* is also extended to 20 June 1982.



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

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Building Materials: Their Science and Technology NATIONAL SEMINAR

Get-togethers and seminars between research engineers and representatives of user organizations and industrial units on problems of building materials and building and construction engineering have been organized in the past by the Central Building Research Institute (CBRI), Roorkee. The purpose of such meetings had been primarily to benefit the user and industry through exposition of utilizable R&D results. The present seminar, which CBRI organized in association with Institution of Engineers (India) [IE(I)] and Indian National Science Academy (INSA), in New Delhi on 15-16 April 1982 was not merely a continuation of its past efforts. It was not a forum to bring to the fore just the details of requirements of bricks,

cement, timber, plastics and other building materials; it provided an opportunity to participants to underscore the vital role of scientific and technological inputs to the solution of problems facing the building materials industry. It also brought to surface a number of areas, such as finding new building materials and finding new uses for existing building materials, which need further intensive efforts.

The tone and direction for the deliberations of the seminar were set by Prof. M.G.K. Menon, who was then Secretary, Department of Science and Technology, while inaugurating the seminar in his capacity as President of INSA. Prof. Menon, who has since taken over as Member (Science) of

Planning Commission, drove home the point that the large infrastructure in science and technology, which the post-independent India has built, should be properly coupled to the needs of the nation. Dwelling on this point, he elaborated that transfer of technology did not mean just transferring to a party a piece of paper containing a laboratory idea. What is more important, he said, is to involve the user and production units with the research scientist or engineer so that there is continuous interaction between the scientific community and the production sector.

In a reference to the topic of the seminar, Prof. Menon emphasized the pressing need for mapping the various types of raw materials available, especially wastes which could be converted into useful building materials. The importance of multi- and interdisciplinary approach, as opposed to the traditional approach in vogue, for producing new building materials was another point on which Prof. Menon laid stress. The INSA president also pointed out, for instance, that a coordinated effort by biologists, botanists, tissue culture experts and others was needed to produce new varieties of timber which could grow even in adverse soil conditions.



Prof. M.G.K. Menon inaugurating the national seminar on Building Materials: their Science & Technology. Seated on the dais (from right) are: Prof. Dinesh Mohan, Lt. Gen. R.A. Lumba, and Shri A.C. Banerjee

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More than 150 delegates from research institutions, university and IIT departments and other laboratories presented 72 papers (more than 50% of which came from CBRI) in four technical sessions devoted to (i) bricks and tiles, (ii) cement and concrete, (iii) lime and lime products, and (iv) organic building materials. The sessions ran concurrently at INSA and IE(I) buildings. As many as 40 recommendations/suggestions, most of them aimed at producing better building materials and components and some setting out new lines of investigation especially relating to energy-conserving methods, were made at the concluding session.

Through one of its recommendations in the area of bricks and tiles the seminar called for improving the design and technology in the manufacture of these building materials from inferior soils. Investigations should be conducted, the seminar suggested, on the thermal efficiency of the newly designed fixed-chimney continuous brick kiln and intermittent kilns in which agricultural wastes could be utilized as fuel. Field trials carried out by CBRI have shown, for example, that rice husk could replace coal up to 30-40% in running a Bull's trench kiln. Among the other suggestions relating to bricks and tiles may be mentioned the one calling for development of technology for high-strength, vitrified and engineering bricks suitable for use in multi-storeyed load-bearing masonry structures.

In the area 'cement and concrete', the seminar recognized that cementing materials conforming to IS specifications on masonry cement, hydraulic lime or lime-pozzolana mixtures could be produced from several industrial and agro-industrial wastes available in the country. Such cementing materials could be used in place of ordinary Portland cement in masonry work, sub-flooring, foundation concrete, and precast building units. Hence the seminar recommended production and use of such cementing materials to

reduce the demand on Portland cement, which then could be made available to more important jobs.

Through other recommendations relating to cement and concrete, the seminar called for: (i) beneficiation of phosphogypsum and use of the beneficiated product for production of building materials; (ii) development of a jointing material for use in construction with precast building units; (iii) development, on priority, of energy-saving cements; (iv) working out the economics of production of Veene's cement from mineral gypsum found in Jammu & Kashmir state and glass fibre-reinforced gypsum composites; and (v) encouraging establishment of mini-cement plants to meet the growing needs of cement in construction industries.

The seminar recommended that greater use of lime and lime products be made in mortars and plasters and for other construction purposes to relieve the demand on cement, which could be restricted to structural purposes.

Recognizing that proper packaging of lime and lime pozzolana materials was a serious handicap preventing their wide use, the seminar suggested that studies should be taken up for developing suitable packaging materials to prevent their deterioration during transit and also to enhance their shelf life.

Intensive R&D work on efficient design of lime kilns and lime hydrators and studies on utilization of wastes from chemical and agricultural industries for producing good-quality lime-pozzolana binders were among the other recommendations in the area of lime and lime products.

In the area of organic building materials, it was recommended that, to save energy and reduce the cost of seasoning, timbers should be seasoned in solar kilns. Other recommendations include: (i) encouraging use of secondary or non-conventional timbers with natural resistance against termite attack; (ii) undertaking research on development and use of low-cost resins from non-petroleum based resources as

well as on development and assessment of building products from such resins; (iii) conducting weathering and durability studies on plastics products with a view to assessing their performance under Indian conditions; and (iv) disseminating information on the utility and limitations of various plastics products. □

Set-up for impedance measurements at CECRI

Impedance measurements are useful for determining corrosion rates of metals in high resistive media and evaluating paint coatings more accurately and quickly. Besides, they are helpful in determining the coverage of inhibitors. The Central Electrochemical Research Institute (CECRI), Karaikudi, has assembled a set-up for making impedance measurements and has tested its performance using analog circuits. Here, an ac signal is applied to the pair of test electrodes immersed in the corroding media and the resultant alternating voltage and phase angle are measured in a gain-phase meter. The



Set-up assembled at CECRI for measuring impedance. The technique is being widely used for measuring electrochemical reaction rates, determining corrosion rates of metals in high resistive media, and evaluating paint coatings. CECRI has studied by this technique the mechanism of inhibition of steel dissolution in hydrochloric acid by hexamine.

ratio of ac voltage to alternating current is the cell impedance which is resolved into a real and an imaginary part. The two parameters, charge transfer resistance (R_t) and double layer capacitance (C_{dl}), are then obtained from a plot of the real part vs imaginary part. Inhibitor efficiency, surface coverage, etc. are determined from R_t and C_{dl} .

CECRI has used this technique for studying the mechanism of inhibition of steel dissolution in hydrochloric acid by hexamine. The inhibitor was found to obey Temkin adsorption isotherm, and inhibited corrosion by blocking the reaction sites since a linear relationship was observed between surface coverage and inhibitor efficiency. □

Pilot plant for theophylline, aminophylline and caffeine demonstrated

The National Chemical Laboratory (NCL), Pune, has successfully carried out pilot plant studies for the preparation of theophylline, aminophylline and caffeine on behalf of PEFCO Foundry and Chemicals Ltd, Pune, the licensee of the laboratory's process. The studies were meant to generate basic engineering data necessary for setting up a commercial plant. The firm, to whom the working of the pilot plant was demonstrated, is now setting up a plant (capacity, 135 tonnes per annum of theophylline and 40 tonnes per annum of aminophylline) at Roha in Maharashtra. The process consists of more than 10 steps and involves handling of large quantities of sodium cyanide and disposal of large quantities of highly toxic effluents.

Theophylline and its derivative, aminophylline, are used as myocardial stimulants, diuretics and as drugs for bronchial asthma. Caffeine is used in pharmaceuticals. It is useful as a stimulant to the nervous system and as a diuretic, and is an ingredient of some beverages. Theophylline and aminophylline are not manufactured in India at present. □

Prime Minister at NEERI

The Prime Minister, and President of CSIR, Smt. Indira Gandhi visited the National Environmental Engineering Research Institute (NEERI), Nagpur, on 10 April 1982. Accompanying the Prime Minister were the CSIR Vice President Prof. S. Nurul Hasan, Union Minister for Information & Broadcasting Shri V.P. Sathe, and Maharashtra's Chief Minister Shri Babasaheb Bhosale. Smt. Gandhi was taken round the algal culture laboratory.

The NEERI Director, Dr B.B. Sundaresan, apprised the Prime Minister of the institute's major contributions, such as, for example, assessment of air quality monitoring in selected Indian cities and quantification of emissions in Bombay and Calcutta. Pollution monitoring in Bombay, he said, was being undertaken by Bombay Municipal Corporation and other agencies. However, follow-up action in Calcutta was yet to be taken up. Work on the development of microbial cultures to biodegradable phenols and cyanides in industrial effluents had been

scaled up from laboratory scale to pilot plant scale. Based on the know-how developed, a full-scale plant had been constructed at Ramakrishnapuram, Andhra Pradesh, added Dr Sundaresan.

Another important contribution of NEERI, the director said, was the evaluation of typical rural water supply schemes in eleven states.

Referring to the institute's role in preserving monuments, Dr Sundaresan said that, based on NEERI's assessment of air quality in Agra, several measures, including the closing down of old thermal power stations, had been undertaken. NEERI had also recommended measures for improving the water quality of Pushkarni tank at Tirupati with a view to safeguarding the health of pilgrims.

The Prime Minister was also briefed on wastewater reuse and recycling through aquaculture and agriculture, another important area of thrust.

Shri V. Raman of NEERI briefed the CSIR President on a national project involving water quality monitoring of the River Ganga from Uttar Kashi to Farakka Barrage. □



The Prime Minister, and CSIR President, Smt. Indira Gandhi at the algal cultural laboratory of NEERI, Nagpur. Dr B.B. Sundaresan (first from left) briefing the CSIR President

Micro-computer at NEERI

A micro-computer, HCL 1800, has been installed at the National Environmental Engineering Research Institute (NEERI), Nagpur. Its main features: a large memory of 64 kbytes, three floppy disc drives (256 kbytes each), a mini floppy drive, a fast bi-directional matrix printer, and an inter-active console with a visual display unit. The system has also a power shut-off and auto-restart facility which keeps the central processing unit alive during power failures. On return of power, work can be resumed from where it had stopped. The system offers BASIC-II and FORTRAN-IV languages.

The computer is available for use by users outside of NEERI also, as its Director, Dr B. Sundaresan, stated while inaugurating the facility on 5 March. □

Toxicity of chromium in chick embryos

Chromium salts are extensively used in various industries and particularly in large amounts in leather industry and the biological toxicity of chromium can be both occupational and environmental. Smt. Gayatri Sarkar of the Central Leather Research Institute (CLRI), Madras, has studied the toxicity of hexavalent chromium using chick embryos as the experimental host.

The lethal dose 50% end point (LD_{50}) of hexavalent chromium was evaluated by testing about 1000 embryonated eggs and was found to be around 300 ppm, i.e. 425 μ g of Cr(VI) per egg.

In vitro studies on yolk sac by using radioactive trivalent and hexavalent chromium showed that chromium(VI) was bound solely to the protein fraction, whereas chromium(III) largely resided in the protein fraction and to some extent in the water-soluble fraction containing carbohydrates.

A study of the distribution of chromium in different tissues of chick embryo showed maximum accumulation in the bone, and in all the tissues, it was present only in the trivalent state.

Physical studies, such as mesopore size distribution, were made on the bone tissue by using moisture sorption hysteresis. The probable form of chromium present in the bone tissue was predicted by X-ray diffraction studies.

Some toxicological effects induced by inoculation with chromium(VI) were: marked reduction in size, weight and area of embryo; change in mineral composition of the whole embryo (wherein calcium: phosphorus ratio, magnesium and iron were specifically studied); significantly lower hatchability; and weaker embryos compared to controls.

Tissue culture of whole chick embryo was used to visually appreciate the possible changes that chromium(VI) might induce on chick embryo cells. Significant cytotoxic effects were observed by light and scanning electron microscopy.

Smt. Sarkar, who carried out the investigations under the guidance of Dr S. Divakaran of CLRI, was awarded Ph.D. degree (1982) of University of Madras for her thesis based on the study. □

Surface properties and features of resin-finished leathers

The surface properties such as gloss and friction of resin-finished leathers and the adhesion of finish film to these leather surfaces have been studied in relation to the surface structure. The researcher is Shri Beema Lokanadam, who carried out the studies at the Central Leather Research Institute (CLRI), Madras.

The most common among finished leathers made from Indian hides, namely corrected grain impregnated leathers, were investigated in detail. Other types of leather investigated include: full grain unimpregnated, full grain impregnated, and corrected grain unimpregnated. These studies are important from the point of view of

improving consumer appeal and durability of the leathers.

Plating, one of the most important operations in leather finishing, increased the per cent gloss of all the leather samples. The optimum temperature and pressure were determined after studying the gloss characteristics of corrected grain impregnated resin plus pigment-coated leathers. The study shows that: (i) impregnation results in improved gloss; (ii) at all plating pressures, corrected grain leathers treated with resin plus pigment are glossier than those treated with resin alone; full grain leathers exhibit a similar trend only at higher pressures; and (iii) gloss increases with plating pressure and/or temperature in corrected grain impregnated resin plus pigment-coated leathers up to a temperature of 71°C, above which it decreases.

The surface friction of leathers, with glass as reference surface, was measured with an accessory designed and attached to an Instron universal tester. Surface friction was found to increase with plating and also with the thickness of the finish in all the leather samples.

The strength of adhesion of finish film to leather surface, determined with a device fabricated and fitted to the Instron universal tester, was found to vary with grain correction and impregnation of the leather surface before applying the finish.

The appearance of the surface of the leathers, as seen in optical micrographs and scanning electron micrographs, was correlated with gloss, friction, and strength of adhesion of the finish film.

Shri Lokanadam, who carried out the study under the guidance of Dr N. Ramanathan, was awarded Ph.D. degree by University of Madras for his thesis based on the studies. □

EXTRAMURAL RESEARCH

Optical properties of thin films

Difficulties in preparing optical coatings is not due so much to lack of theoretical film design as to suitable film materials with stable optical properties. Many

workers have tackled the problem of aging of optical films and adduced reasons for aging, but none of them has provided a suitable solution on a generalized level, so that the method could be applied for any type of material and system. This has prompted a CSIR research fellow, Kum. K. Vijaya, to study and control the aging of optical films of cryolite, MgF_2 , ZnS and mixed cryolite- MgF_2 . The researcher, who worked under the guidance of Prof. R.N. Karekar at the Department of Physics, University of Poona, Pune, used ellipsometry to study the changes in refractive index on aging under various ambients.

A new technique of chopping the vapour flow during deposition of the films was tried with success in reducing the aging of the films. The chopping rate was of the order of 5-6 rotations per second.

The changes in refractive index under the various ambients of air, moisture at three temperatures (12°C , 27°C and 55°C), heat (120°), steam, gases like oxygen and carbon dioxide, were lesser for chopped films than for non-chopped ones.

Mixing of two materials with different refractive indices can provide material with an intermediate refractive index. A significant achievement of the study is the mixing by co-deposition technique by using two sources. It has been found that mixed, chopped films age the least in most ambients and that none of the mixed films shows any crazing tendencies. The results thus indicate that a suitable mixture of components with complementary stresses might be helpful in aging reduction.

The changes in refractive indices, as measured by ellipsometry, could be interpreted as due to various processes like oxidation, dehydration, moisture penetration, temperature effects, and stresses. Chopping seems to quench the columnar crystal growth observed in these films, thereby reducing the void content. This might contribute to the

reduction in aging of the chopped film. □

PROGRESS REPORTS

RRL-Bhubaneswar Annual Report: 1981-82

The annual report of the Regional Research Laboratory (RRL), Bhubaneswar, for the year 1981-82, brought out recently, shows that the laboratory has been concentrating, as in the previous years, on R&D work aimed at conservation and proper utilization of natural resources, especially minerals. Mineralogical and metallographic studies were carried out on a number of ore samples, their concentrates, middlings, tailings, and sinters. Mineralogical studies on copper, lead and zinc complex sulphide ore samples from Ambamata were completed. Bench-scale studies followed by large-scale studies indicated that 53% copper, 65% lead, and 61% zinc could be recovered by gravity methods into a concentrate containing 4% copper, 15% lead, and 21% zinc. Studies on characterization of offshore sediments of Konkan coast were continued in collaboration with the National Institute of Oceanography (NIO), Goa. Mineralogy of manganese nodules collected by NIO from the Indian Ocean was taken up for study. Iron ores from Barsua mines (Orissa) were being characterized in collaboration with Rourkela Steel Plant.

Mineralogical evaluation of iron-rich fire-clay of Chudanga area with a view to upgrading the mineral for utilization in refractory industries was under way in a project sponsored by Orissa Industries Ltd. Studies on iron ore tailings from mechanized iron ore washing plants have shown the possibility of recovering substantial iron values from the tailings by classification along at $20\text{ }\mu\text{m}$.

In a continuing consultancy project for Ferro Alloy Corporation (FACOR) at Garividi, Andhra Pradesh, regarding the setting up of a 50 tonnes per day

pilot plant for sintering manganese ores fines, the designing of most of equipment was completed and detailed engineering shop-floor drawings were under preparation. In a project started in collaboration with Engineers India Ltd (EIL) for transporting solid materials like coal and iron ore through pipes in a slurry form, considerable progress was made in both bench-scale work and pilot plant installation.

In a project investigated in collaboration with Mineral Development Board, attempts were being made to use manganese ore fines after sintering them, through a process this laboratory had developed, for production of ferro-manganese in an electric furnace. The results were encouraging.

Of great importance in harnessing solar energy is a project, sponsored by the Department of Science and Technology, for preparing solar-grade silicon from metallurgical-grade silicon. Exploratory studies on slag-refining of solvent-refined silicon were carried out. Directional solidification of solvent-refined silicon yielded impurity-free silicon with large grains and sharp grain boundaries.

In inorganic chemicals group, the laboratory prepared for a party a project report on production of synthetic iron oxide black and red pigments in a small-scale sector. In a project sponsored by Indian Petrochemicals Corporation Ltd, the laboratory completed experimental work on the preparation of carrier-grade alumina by precipitation from homogeneous solution and impregnation of platinum onto it. The catalyst was found comparable with the commercial catalyst in properties and performance as revealed by tests at IPCL's R&D centre.

The glycoalkaloid solasodine was recovered in 90% yield from *Solanum khasianum* berries of RRL (Bhubaneswar) Y-14 variety; from samples containing 1.7 to 1.8% of solasodine, recoveries of up to 1.6% could be achieved. The production cost of solasodine works out to be Rs 500 per

kg, with the cost of the berries at Rs 41 per kg and a capital investment of Rs 28 lakh. A project report on large-scale extraction was furnished to the sponsor Industrial Promotion and Investment Corporation of Orissa Ltd.

A new project on developing a process for the production of condenser paper by using indigenous raw materials like staple cotton, hemp fibre and sisal waste fibre was taken up. Condenser paper, a very thin tissue paper used as dielectrics in electrical capacitors, is being imported for meeting the country's demand.

Work was in progress on the isolation of gallic acid from *Terminalia chebula* fruit cover. Gallic acid is an important starting material in the production of trimethoprim used in pharmaceutical formulations.

An acoustic burner designed and developed by the laboratory for economizing on the consumption of fuels in furnaces was given trials in a rotary kiln. The results indicated appreciable savings in furnace oil.

. During the year under review, 32 papers were published, and 5 patents were filed. □

Occupational Health Aspects of Textile and Allied Industries

AN OVERVIEW WITH A BIBLIOGRAPHY

Indian work on occupational health aspects of textile and allied industries has been covered in this bibliography brought out (mimeograph form, 110 pages) by the Industrial Toxicology Research Centre (ITRC), Lucknow. Following an overview of the subject (by S.K. Rastogi), the bibliography contains 587 references from 1925 to 1981 arranged under eight broad headings: Cotton, Hemp, Flax, Jute, Sisal, Silk, Wool, and Nylon. Includes subject and author indexes. Compiled by R.R. Khan, S.N. Agarwal and Usha Nigam, this is the second in the series; the first bibliography was on 'Health effects of toxic metals'.

Unpriced, the bibliography may be obtained by writing to: The Director, ITRC, P.B. 80, Lucknow 226001. □

Influence of Metropolitan Proximity on Skill Formation of Rural Workers

'The net impact of metropolitan proximity on rural workers is that the lust for the urban life and eagerness to adopt urban value systems are on the increase'. Thus concludes a report (22 pages) published by the National Institute of Science, Technology and Development Studies (NISTADS), New Delhi, following a case study of Haryana villages. The study was confined to rural artisans, farmers and agricultural labourers in Sonapat, Gurgaon and Rohtak, from three districts of Haryana, each in the neighbourhood of Delhi and connected with Delhi.

However, proximity has its beneficial effects on the farming community, receiving, as it does, new information, tools and implements, fertilizers and energy, leading to higher productivity and better management of agricultural production.

How about the effect on artisans? The study shows that their economic conditions are adversely affected and their commitment to their age-old occupation is diminishing.

The publication (unpriced), authored by A. Rahman, M.A. Qureshi, S.S. Solanki and V.N. Vashist, is available from NISTADS, CSIR Complex, Hillside Road, New Delhi 110012. □

CONFERENCE BRIEFS

WHO Working Group on Human Ecology and Health Meeting

Dr B.B. Sundaresan, Director, National Environmental Engineering Research Institute (NEERI), Nagpur, attended a meeting of the working group on Human Ecology and Health held at Metepec, Mexico, during 11-13 February 1982. Dr Sundaresan's report:

The meeting discussed the role that WHO should play in human ecology and health and suggested specific activities and approaches at national and international levels that would be of direct relevance to its goal of achieving 'health for all by the year 2000'.

The working group addressed itself to those aspects of human ecology which involved interactions between man and his physical, biological, social and environmental aspects of health. The group regarded multiple sets of man-environment interactions as a system, and human health, as defined by WHO, as a criterion by which the function of the system should be assessed.

The constraints which impeded effective coping with the problems of human ecosystem were discussed under three broad groups: social, organizational, and technological.

Realizing that the economic development as a tool to improve the quality of life had led to several undesirable side effects on the human ecosystem, the group called for assistance of WHO for coordinating national/international actions with other UN agencies so as to integrate economic development within an ecological framework. WHO should, the working group recommended, support research programmes which laid emphasis on ecological approaches to disease control instead of exclusive reliance on pesticides, drugs, etc.

WHO could also help develop methods useful in providing a Health Impact Statement on major developmental projects undertaken by other agencies and help evaluate the risk and benefits of such projects.

Adoption of human ecology as a topic for World Health Day in order to increase public awareness was another of the suggestions made at the meeting.

International Workshop on Resistance to Insecticides

Dr C.R. Krishna Murti, Director, Industrial Toxicology Research Centre,

(ITRC), Lucknow, participated in the International Workshop on Resistance to Insecticides used in Public Health and Agriculture, held at Colombo, 22-26 February 1982. Organized by the National Science Council of Sri Lanka, the workshop was supported by WHO, FAO, Centre for Overseas Pest Research, London, and Australian Development Assistance Bureau. The development of resistance to pesticides in vectors of disease in man and animals is now recognized as a major global problem and the workshop attempted to review the current status of knowledge of the resistance phenomenon and to explore strategies for countering the resistance, reports Dr Krishna Murti, who presented a country paper entitled 'Resistance to insecticides used in public health and agriculture—the Indian scene'.

The ITRC Director reports further: The workshop reiterated that a reduction in selection pressure, i.e. induced pesticide usage, is the key factor to avoid or retard insecticide resistance development. The need for elaboration of the economic damage threshold of major agricultural crops was emphasized, as also the use of integrated pest control management. The workshop called upon governments to develop rationally based pesticide management policies by promoting economic, safe and effective use of pesticides, minimizing their adverse effects. It highlighted the urgent need for increased collaboration between public health and agricultural authorities in formulating pesticides management policies. Also emphasized by the workshop was the urgent necessity for intensive R&D efforts for filling gaps in our knowledge of the mechanism of resistance, new control strategies, ecological aspects, and biochemistry and genetics of insects.

First World Congress of IBRO

Dr R.C. Srimal of the Central Drug Research Institute, Lucknow, partici-

pated in the First World Congress of the International Brain Research Organisation (IBRO), held at Lausanne, Switzerland, 31 March-6 April 1982. Dr Srimal's report: The congress, whose theme was 'the brain in health and disease', was attended by about 1300 scientists from different disciplines working on the central nervous system. The programme consisted of 14 plenary lectures, two special lectures, 28 symposia, six practical workshops and 724 posters, which covered practically all aspects of brain research. India was represented by about 30 scientists, of whom Prof. P.N. Tandon of All India Institute of Medical Sciences, New Delhi, chaired one of the symposia, while others presented their works through posters. In the workshops, specialized techniques used in the anatomy and neurology departments of Lausanne University were demonstrated. These included neuronal labelling for light and electron microscopy, quantitative methods in neuroanatomy, neuroanatomical tracing techniques, CSF tests in demyelinating diseases, and clinical applications of evoked potentials.

The symposia covered such important topics as: axoplasmic transport, mechanisms and applications; autonomic nervous system; Alzheimer's disease; excitatory amino acid transmitters; neurobiology of pain; neuro-oncology; nerve cell conduction and transmission; neurotoxins as tools; nutrition and the brain; biology of schizophrenia; synaptic organization of identified neurons; theoretical models of brain function; and parasitic diseases of the nervous system. □

DEPUTATION BRIEFS

Dr N.C. Saxena of the Central Mining Research Station, Dhanbad, who was deputed to FRG from 13 January to 28 February 1982 under the CSIR-DAAD Exchange of Scientists Programme, visited various mining institutes to study the latest technologies in mining engineering, such as subsidence/ground

movement research, open-cast mining and underground strata control in longwall faces, and gate roads and roadways. □

PERSONNEL NEWS

Appointments/Promotions

Shri B.J. Srivastava

Shri B.J. Srivastava of the National Geophysical Research Institute (NGRI), Hyderabad, has been promoted, on assessment, as Scientist EI (9 June 1981).

An M.Sc. (1949) in applied mathematics from the University of Allahabad, Shri Srivastava had taught at the Christian College, Allahabad, before he began his researches in geomagnetism at the Colaba and Alibag observatories of the India Meteorological Department in 1952. He joined NGRI on 9 June 1965 as Scientist B.

Project leader of NGRI's geomagnetism group, Shri Srivastava has done pioneering work in geoelectromagnetism, based on the geomagnetic data recorded at the magnetic observatories in India, besides operating the NGRI's magnetic observatory at Hyderabad. His researches have clearly brought out the influence of deep geological structures and the ocean on the geomagnetic records taken at different locations in India; a zone of high electrical conductivity beneath the Aravalli Hills in association with high gravity and high heat-flow values, and asthenospheric upwelling; absence of a subsurface conductor beneath the lesser Himalayas in north-west India along its strike; and also the ocean effect in peninsular India. He has demonstrated the oscillations of the magnetic (dip) equator in India with a period of about 80 years. His other research interests include solar geomagnetic-climatic-biomedical correlations and solar-terrestrial physics. He has published 90 research papers.

Shri Srivastava represents India on a specialist committee on ELAS (Electrical Conductivity of the Asthenosphere).

sphere) of IAGA (International Association of Geomagnetism and Aeronomy) of IUGG (International Union of Geodesy and Geophysics).

Also promoted, on assessment, at NGRI are: Shri S. Narayana (Scientist C, 19 Oct. 1981), Shri P.G.K. Bhat (Technical Officer B, 24 Feb. 1981), and Shri B.P. Ramanujacharya (Photographic Officer B, 12 May 1980).

Shri D.K. Das

Shri D.K. Das, Scientist C, Central Leather Research Institute, Madras, has been promoted as Scientist EI (30 Jan. 1982). □

Honours & Awards

Dr C.R. Krishna Murti, Director, Industrial Toxicology Research Centre, Lucknow, delivered the 1982 Dr K.M. Bhansali Memorial oration at the 30th annual convention of the Indian Association of Occupational Health held jointly with the 32nd All India Conference on Occupational Health at Bombay on 2 April 1982. The topic of oration was: Epidemiological studies on environmental toxins.

Prof. P.K. Jena, Director, Regional Research Laboratory, Bhubaneswar, has been invited by Unesco to serve as a member of the jury for a period of three years for the Kalinga Prize for popularization of science. He is the first Indian scientist to be honoured with the membership of the jury for this Unesco award. □

Retirements

Shri A.M. Lele, Scientist EI, National Chemical Laboratory (NCL), Pune (who was on deputation to the Rural Development Centre as the deputy chief coordinator), retired voluntarily on 31 March 1982 after over 30 years' service in the laboratory. A pioneer in science popularization in Marathi, Shri Lele has written over 150 popular science articles in Marathi and authored/translated five books. □

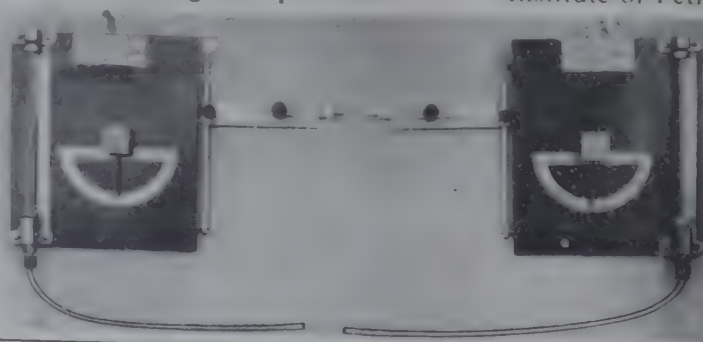
PATENTS INFORMATION

Indian Pat. 149410
(Application No. 228/Del/77)

Device for measuring settlement characteristics of buildings and other structures

T.K. Natarajan, R.K. Bhandari, B. Malhotra, Kartar Singh & S.S. Rup
Central Road Research Institute, New Delhi

A composite device to monitor the settlement behaviour of buildings and other civil engineering structures by measuring differential settlement, tilt and crack width, has been developed at the Central Road Research Institute (CRR), New Delhi. Essentially, the device comprises a water level consisting of two graduated Perspex tubes mounted one on each plate, connected by a nylon tubing and filled with a clean, non-volatile liquid; a pair of two freely suspended pointers, each moving on an angular scale mounted on the plate; and two adjustable pointers to measure progression in crack width. The two plates are mounted on the two ends of a wall or on two adjacent columns. These can also be mounted on the two edges of a crack developed on a wall. The level of the liquid in each tube is noted and the difference in levels is recorded. If the wall experiences differential settlement, the level of the liquid in each tube alters and the difference in level is again recorded. The variation in the difference of levels of the liquid in two tubes, noted initially and subsequently, corresponds to differential settlement. The shift in the position of the pointers on the angular scale gives the amount of tilt. Progression in crack width is measured by bringing the tips of the sliding pointers to the edges of the widened crack and noting their positions.



Composite device developed by CRR for measuring differential settlement, tilt and crack width in buildings

The device can simultaneously measure all the settlement parameters with a high degree of accuracy, and also can monitor even the slightest abnormality in the settlement behaviour of a building. It is being marketed by Associated Instrument Manufacturers (India) Pvt Ltd. □

PATENTS FILED

788/Del/81: Process for the preparation of titanium for use as substrate for coating and like operations, H.V.K. Udupa, M. Nagalingam, N. Thiagarajan, S. Pushpavanam, M. Sadagopalan, R. Palanisamy, N.S. Raghavendran & V. Rengarajan—Central Electrochemical Research Institute, Karaikudi.

793/Del/81: Improved process for the production of spiral manganese dioxide electrodes, R. Gangadharan, P.N.N. Namboodiri, K.V. Prasad, S. Muthukaruppan & H.V.K. Udupa—Central Electrochemical Research Institute, Karaikudi.

794/Del/81: Improved process for immersion stripping of nickel electrodeposits from steel and stainless steel substrates, H.V.K. Udupa, S.R. Natarajan, S. Sriveeraraghavan & R. Krishnan—Central Electrochemical Research Institute, Karaikudi.

820/Del/81: Electrochemical preparation of chromate from chromium oxide using nickel oxyhydroxide anode, H.V.K. Udupa, K.S. Udupa & D.C. Trivedi—Central Electrochemical Research Institute, Karaikudi.

822/Del/81: An improved liquid fuel burner for industrial furnaces, P.N. Bhambi & H.K. Madan—Indian Institute of Petroleum, Dehra Dun. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

VOL. 32 NO. 11 15 JUNE 1982

NPL launches successfully its first balloon facility

A balloon carrying a payload designed and developed by the National Physical Laboratory (NPL), New Delhi, for measuring positive and negative ion densities in the stratosphere was launched successfully. It was done at 0028 hrs on 23 March 1982 from TIFR (Tata Institute of Fundamental Research) balloon facility at Hyderabad.

The payload for this experiment contained a Langmuir probe, a logarithmic current amplifier and associated electronics. A symmetrical probe voltage of ± 4.2 V, 0.28 Hz repetition frequency and of triangular waveform was applied to both the insulated nose tip (which was used as the probe) and an adjacent section of the nose cone ogive, which was also well isolated from the rest of the balloon's common ground. The instrument which measured the probe current was a metal oxide semiconductor field effect transistor (MOSFET)-input electrometer amplifier with logarithmic characteristics between 5×10^{-11} and 5×10^{-7} A for positive ions and 5×10^{-11} and 5×10^{-8} A for negative ions. It was inserted between the nose tip and the isolated, adjacent section of the nose cone ogive of the probe.

The major problem for a balloon flight, particularly at night, is the very cold temperature the payload encounters at the tropopause. The usual temperature at the tropopause is -80° to -90°C at which the payload electronics will not survive. To overcome this problem, the steel rack which housed the payload, telemetry, transmitter, battery pack, etc. was fully

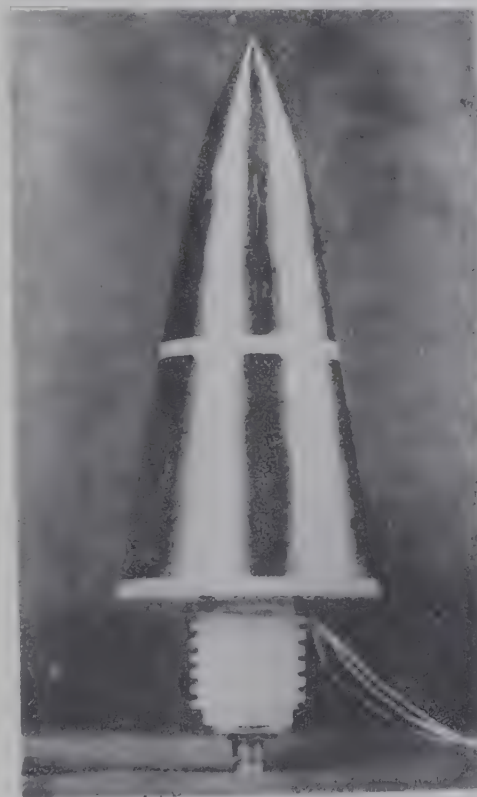
covered by thick thermocol sheets in order to ensure that the inside temperature stayed around 0°C . The instrument was tested earlier at -2°C for a few hours to qualify it for the balloon flight. The total weight of the experimental package with thermal shielding was around 45 kg and the total

lift weight of the balloon was about 1100 kg.

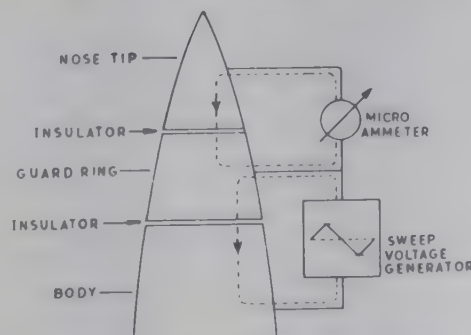
The balloon ascended at the rate of 200 m/min and it took about $3\frac{1}{2}$ hr for the balloon to reach the ceiling altitude of 33 km. It was allowed to float at the ceiling for nearly 2 hr before it was cut off. The experiment worked very well all through $5\frac{1}{2}$ hr and gave very good data.

This is the first balloon experiment to be conducted under the Indian Middle Atmosphere Programme (IMAP). International in character, MAP is perhaps the most significant programme since the International Geophysical Year (1958-) in which Indian scientists will play a dominant role. IMAP, which has been officially adopted as a national project by the Government of India, was started on 1 January 1982 to synchronize with the international MAP. To continue till the end of 1985, the programme is expected to shed light on how changes caused by natural and man-made events in the atmosphere could affect our lives.

The project team comprised Dr Y.V. Somayajulu (principal investigator) and Shri A. Banerjee and Shri P. Subrahmanyam (associate investigators); technical assistance was provided by Shri N.N. Kaul, Shri Vishram Singh, and Smt. P. Chopra. □



Probe model



Langmuir probe: schematic representation

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Integrated digital temperature indicator

Based on latest devices and advanced technology for the precise measurement of temperature in industrial, engineering and research institutions, an integrated digital temperature indicator has been designed and developed by the Central Scientific Instruments Organisation (CSIO), Chandigarh, for the first time in the country. The indicator provides the process industry with an instrument for which persistent need has existed for a long time, especially in these days of energy crisis.

The instrument is entirely different from the digital temperature indicator based on hybrid technology developed earlier by CSIO and whose know-how has already been commercialized. The difference lies in the way it makes use of the complete digital technique for linearization of output of different thermocouples. Erasable Programmable Read-Only Memory (EPROM-2758-1K-8 bits) has been incorporated to accommodate the correction programme of linearization of six widely used thermocouple types—J, K, T, R, S and E—to cover a range varying from -100°C to $+1760^{\circ}\text{C}$. Single gain has been kept for all segments involved in a particular thermocouple. For a highly non-linear thermocouple, the maximum number of segments has been restricted to 32, i.e. only 32 locations of EPROM have been allocated for each sensor. A

binary rate multiplier has been incorporated to accomplish the linearization in association with the correction data stored in EPROM. The rate multiplier reduces the burst of 128/64 pulses, to a lesser number as the case may be, in accordance with the stored value in EPROM. From front panel, any thermocouple may be selected through an outside-mounted rotary selector switch. Automatic cold junction compensation is provided.

With a $3\frac{1}{2}$ digit LED display, the indicator has an accuracy of 0.25% FSD ± 1 digit and an input impedance of 100 kohm. \square

Turbidity meter

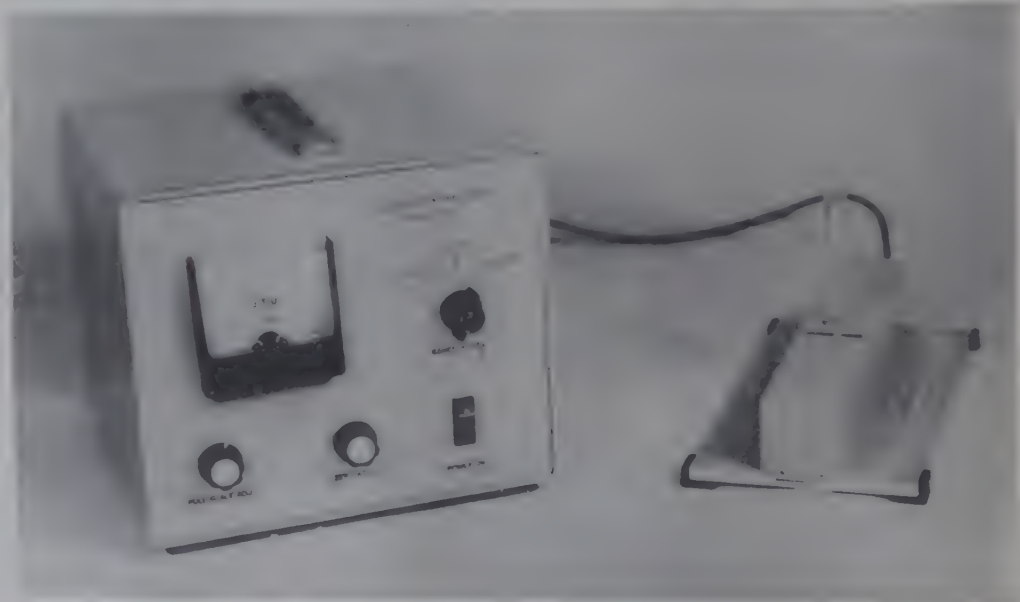
In view of the great demand for pollution monitoring instruments, whose demand is at present being met by imports, the Central Scientific Instruments Organisation (CSIO), Chandigarh, has embarked on a programme of developing such instruments. The first of the instruments designed and developed in this programme is the turbidity meter. It measures the suspended solids content of water samples. Still under evaluation, it works

over three ranges 0-10, 0-100, and 0-1000 JTU. It can meet the demands of municipal water treatment plants, boards for prevention and control of water pollution, and of numerous industries where raw water of a specific turbidity must be fed. It can also be used for determining the concentration of such pollutants as sulphates, chlorides, and nitrates by the use of suitable reagents and the measurement of resultant turbidity of the precipitates.

The instrument has an optical part which operates as a sensor. Light from an ac powered bulb is made into a parallel beam by a suitable lens system and through a slit it falls on an appropriately selected high-quality glass test-tube which contains the water sample. The emerging beam is focused on a silicon photodiode, which converts the light signal into an electrical signal. The latter is processed by a preamplifier, an amplifier, a tuned amplifier, and other necessary electronics. The output signal is directly proportional to the turbidity of the sample and is indicated on a microammeter. The bulb is lighted from an oscillator, which gives an output of 6 V, 83 Hz. The signals from



Integrated digital temperature indicator designed and developed by CSIO for precise measurement of temperature in industrial, engineering and research institutions



Turbidity meter designed and developed by CSIO for monitoring pollution. The instrument can measure suspended pollutants in water and meets the demands of municipal water treatment plants, boards for prevention and control of water pollution, and numerous industries where raw water of a specific turbidity must be fed. Can also be used for determining the concentration of such pollutants as sulphates, chlorides, and nitrates.

the preamplifier are amplified by the amplifier and then preferentially selected by a tuned amplifier.

The instrument thus eliminates any other noise or spurious signals, or signals from ac power lines, or its harmonics, and ensures high sensitivity and selectivity.

Other pollution monitoring devices under design and development at CSIO are a stack smoke density monitor, a sulphur dioxide monitor, and a particle counter. □

Alcohol from tapioca

Based on the know-how developed by the Central Food Technological Research Institute (CFTRI), Mysore, a firm in Kerala will be manufacturing alcohol from tapioca for the first time in the country. Tapioca is available in plenty in India and its production can be increased through modern cultivation techniques. The CFTRI process consists in converting the tapioca flour into fermentable sugars with enzymes prior to fermentation with yeast.

CFTRI has also developed a technique for manufacturing amyloglycosidase, one of the two enzymes required in the process, and has passed on the technique to two firms.

Current production of alcohol is fully based on cane-sugar molasses. India's annual production of ethanol is estimated at 500 million litres versus a demand of 600 million litres. The cost of production works out to be Rs 7 per litre based on fresh tapioca price of 50 paise per kg. Commercially available sun-dried tapioca chips can also be used in the CFTRI process. □

CGCRI's Extension Centre at Khurja

An extension centre of the Central Glass & Ceramic Research Institute (CGCRI), Calcutta, has started functioning at Khurja, Uttar Pradesh, since 27 March 1982. Set up in collaboration with the U.P. government, the centre has as its main objective the improvement of the performance and economics of the glass

and ceramic industries in the state. U.P. has a heavy concentration of glass and ceramic industry, both in the small and in the cottage sectors, employing more than one lakh persons and turning out goods worth more than Rs 500 million per annum. The main regions of ceramic industry are located at Khurja, Chanar, Chinhath, Basti and Ghaziabad, while those of glass industry are situated at Firozabad, Varanasi, Allahabad, Shikohabad and Sahibabad.

Khurja has the highest number of small and cottage scale ceramic industries in the country with more than 500 units employing about 20,000 people and having an annual turnover of about Rs 100 million. It has been producing traditional potteries for the last several centuries and ceramic wares on modern lines since World War II. In the initial stage, the extension centre will

be primarily concerned with rendering assistance to ceramic industries at Khurja in solving their technical problems through the testing of raw materials and finished products and consultancy services. In course of time, its activities would be extended to glass and ceramic industries in other parts of the state.

To mark the inauguration of the CGCRI extension centre, a two-day 'Pottery Mela' was organized on 27-28 March 1982 by the pottery and glass industries in the state. A two-day technical seminar was also organized simultaneously.

A status report on the ceramic industry at Khurja was released on the occasion. The report also deals with the problems and prospects of the small- and cottage-scale ceramic units at Khurja. □



At the 'Pottery Mela' held on the occasion of inauguration of the CGCRI extension centre at Khurja (U.P.) the CGCRI Director Dr S. Kumar (extreme right) is seen explaining the exhibits at the institute's stall.

CBRI and Building Industry Get-together

The latest of the get-togethers on 'Recent Developments in Building Materials and Techniques' organized by the Central Building Research Institute (CBRI), Roorkee, in collaboration with Institution of Engineers (India) [IE(I)] was held at Lucknow from 24 to 26 April, 1982. It was organized in collaboration with IE(I)'s U.P. State Centre, Lucknow, and with the participation of U.P. Public Works Department's Jal Nigam, U.P. Avas Evam Vikas Parishad, and U.P. Rajkiya Nirman Nigam.

The purpose of the get-together was to acquaint field engineers, architects, materials manufacturers and others with new building materials and construction techniques which could help solve the acute shortage of scarce building materials like cement and steel besides reducing the overall cost and time of construction.

Three technical talks were delivered by CBRI's scientists: (i) Recent developments in building materials and techniques (R.C. Mangal); (ii) Economy in foundations through research (Amar Singh); and (iii) Researches on efficiency of buildings for energy conservation and environmental comfort (B.K. Saxena).

In his lecture, Shri Mangal advocated the use of lime-based cementitious binders in mortar and plaster to meet the acute shortage of cement, and suggested the manufacture of new building materials from various agro-industrial wastes such as fly ash, wood-wool, coconut fibre, and lime sludge. Secondary species of timber could be used after seasoning for door and window frames and shutters, for which a solar seasoning kiln had been developed at the institute, said the speaker. He also highlighted several techniques developed by the institute, viz. stone masonry blocks for walling, channel units, cored units, R.C. planks, thin *in-situ* ribbed slab, prefabricated brick panels, waffle units, and L-pan for

flooring/roofing, which could be easily adopted for building better, faster and economic houses. These techniques, said the CBRI scientist, were being used by various housing boards, state and central public works departments, development authorities, Military Engineer Services, and others in different parts of the country. He also mentioned about the work of the institute for housing the rural poor and other weaker sections of the society.

Highlighting the various ways and means of effecting economy in the design and construction of foundations, Shri Amar Singh explained how field engineers could cut down the cost of soil exploration. In highly treacherous black cotton soils, the institute's techniques of underreamed pile foundation, the speaker said, were 15 to 50% cheaper in comparison with conventional foundations, while bored compaction piles developed by the institute were economical in reclaimed and filled-up areas. He also mentioned special techniques by which weak soils could be strengthened and the foundation cost could be reduced by about 50%. The institute's technique of rope drain could be usefully employed for artificial consolidation of soft clay deposits. For non-cohesive soils, he added, the institute had developed granular piles which could provide economical foundations for buildings and other industrial structures.

Dr Saxena emphasized the importance of various parameters such as heat, light, ventilation, and acoustics for determining the functional efficiency of buildings. He covered recent designs relating to windows, artificial lighting, and energy conservation and mentioned that CBRI had evolved suitable indices in regard to thermal comforts and lighting levels as related to visual acuity under Indian conditions. The influence of various parameters, such as external obstruction and dimensions and locations of windows for different rooms, had been investigated by the institute. He also mentioned that CBRI had

developed solar water heaters, the design of which had already been licenced to the building industry. For conserving electrical energy, Dr Saxena advocated the use of fluorescent tubes in place of incandescent lamps.

In his opening address, Prof. Dinesh Mohan, CBRI's Director, highlighted several techniques of the institute which were being adopted all over the country and had saved tens of millions of rupees to the nation. He specifically mentioned the underreamed and bored compaction pile foundation techniques which were being used by developing countries as well. For rural areas, where mud walls and thatched roofs are still predominant, he added, the institute had developed techniques for making mud walls waterproof and thatches fire-retardant.

Dr Ghananand Pande, former Vice Chancellor of University of Roorkee, inaugurated the get-together and an exhibition of building materials and techniques developed by CBRI. In his inaugural address, Dr Pande emphasized the need for solving the formidable problem of housing the teeming millions in rural as well as urban areas and advised the state engineers and architects and all those concerned to adopt the appropriate technologies developed by CBRI to bring down the cost and time of construction.

On 26 April a demonstration of casting of R.C. plank, R.B. panel and R.C. joists for flooring/roofing was also arranged at Institution of Engineers (India) for the benefit of practising engineers and contractors. Visits to different construction sites where CBRI techniques are being adopted were also arranged. □

New alkaloids and coumarins from *Adhatoda vasica* and *Prangos pabularia*

From *Adhatoda vasica* two new alkaloids adhatonine and vasicol have been characterized as 9-acetamido-3,4-

dihydropyrido[3,4-*b*]indole and 1,2,3,4,9,11-hexahydro[2,1-*b*]quinazoline-3,11-diol respectively, out of the ten compounds characterized. The researcher is Shri Surrinder Koul who made the study at the Regional Research Laboratory (RRL), Jammu. A third compound ethyl α -D-galactopyranoside was also isolated for the first time from natural sources.

Out of 16 coumarins identified from *Prangos pabularia*, a new coumarin glucoside was isolated and established as 4-(3- β -D-glucopyranosyloxy)-2-hydroxy-3-methylbutoxyfuro[3,2-*g*] [1]benzopyran-7(*H*)-one. The compound showed a marginal cardiovascular activity.

Shri Koul, who carried out these studies under the guidance of Dr K.L. Dhar of RRL-Jammu, was awarded Ph.D. degree by University of Jammu. □

Bio-ecology of aquatic insects of Jammu & Kashmir

More than 150 new records of aquatic insects of Jammu & Kashmir State have been made by a researcher Shri S.K. Chowdhary of the Regional Research Laboratory (RRL), Jammu. Three new species have been established. The emphasis of the studies was on physiography and entomofauna of water bodies of the state; physico-chemical parameters and insect populations; habit and habitat; ecological niches of insect larvae, nymphs and imagoes; life history; and adaptation in aquatic insects. Also, Kashmir streams have been found to be best suited for trout culture owing to the abundance of insect fauna.

Shri Chowdhary was awarded Ph.D. degree by University of Kumaun, Naini Tal, for his thesis based on the ecological studies, made under the supervision of Prof. S.M. Das of D.S.B. University College, Naini Tal. □

Anatomical parameters and biomechanics of human foot
The growth of human foot and its various functions, viz. weight bearing

while standing and walking, flexion and extension at the ankle and metatarsophalangeal (MTP) joints and the motion of different anatomical landmarks of the leg during walking, formed the subject of study made by Shri D.L. Venkateswara Rao of the Central Leather Research Institute (CLRI), Madras. He also made a comparative study of the normal foot with various abnormal feet such as flat foot, calcaneal spur and foot-drop afflicted foot.

A measuring device for obtaining the anatomical parameters on the foot was designed and fabricated. By using this device a number of parameters were measured on children of both sexes belonging to the age group 5 to 11 years and adults in the age group 25 to 45 years. The parameters were measured on the actual foot as well as on the foot plan. The results revealed that once the joint width of the foot was measured, it was possible to compute all the remaining parameters, enabling the standardization of the shoe last measurements.

The weight distribution under the sole of the foot while a person is standing and in locomotion was studied with a barograph and a microdensitometer. A comparative study of the normal foot with the abnormal one showed that it was possible to estimate the degree of abnormality in the foot and the subsequent change in the gait pattern. This would facilitate the production of proper footwear for the abnormal foot.

An electrogoniometer was designed and fabricated for obtaining the varying angles during flexion and extension at the ankle and MTP joints in sitting as well as in standing postures and during walking.

The electromyographic study of a patient with foot-drop caused by surgery for disc prolapse revealed that physiotherapy could recover the toe extensors and the plantar flexors, but not the tibialis anterior to a greater extent. Peroneus longus seemed to be active during full-flat phase of walking

for a flat-foot subject. The body weight was found to affect the duration or periods of different phases of walking.

Cinematographic technique was used for tracking the various leg markers, viz. heel, MTP joint, ankle joint and knee joint, for the study of gait of children walking barefoot. These data when compared with those on children walking in shoes revealed that their walk was more jerky without footwear. The angular velocities and accelerations at the ankle joint confirmed this view.

This investigation was carried out under the guidance of Dr N. Ramanathan of the institute. Shri Rao was awarded Ph.D. degree by Madras University (1981) for his thesis based on the studies. □

PROGRESS REPORTS

ITRC Scientific Report: 1978-80

The two-year scientific report of the Industrial Toxicology Research Centre (ITRC), Lucknow, shows that immunological, behavioural and ecological approaches were brought to bear on some of the on-going projects. A Central Facility for Safety Evaluation of Pesticides and Industrial Chemicals was established as the institute's extension centre at Lucknow-Kanpur Highway for evaluating chronic long-term effects of toxic industrial and agrochemicals and for devising tests to detect toxic symptoms.

A nucleus for environmental monitoring was set up for collecting data on pollution by hazardous chemicals and noise. The studies carried out included: survey of the work environment of Iycon Chemical Factory at New Delhi; dust and noise survey in saw mills in Lucknow; dust survey in work environment of UP Asbestos Ltd in Lucknow; and survey of congested traffic points in Lucknow to examine airborne particulate matter, sulphur dioxide concentration, and noise level.

Metabolic, pharmacological, toxicological, cytological and histopathological studies were carried out on

the broad-spectrum pesticide endosulfan. Biochemical studies showed that osmotic fragility of cat RBC increased significantly, accompanied by a decrease in blood glutathione. Levels of epinephrine, norepinephrine and dopamine were determined in different regions of the brain of endosulfan-exposed animals at different time intervals; it was found that levels of the amines increased up to 4 hr in all the regions and then showed a rapid decline. Effects of the pesticide on cardiovascular system and on blood glucose were also studied.

Teratogenic and embryotoxic effects of endosulfan were evaluated in rats. The effect of endosulfan was determined on the plasma electrolytes, content of glucose, calcium and glutathione in blood and that of ascorbic acid and glutathione in brain of experimental animals. It was demonstrated that the insecticide caused marked increase in the activities of certain drug-metabolizing enzymes and lipid peroxidation which was dose-dependent. Pharmacokinetic studies on the α - and β -isomers of endosulfan showed a pronounced difference in their toxicity profiles.

Histochemical, morphological and biochemical changes observed in vital organs of experimental animals following exposure to benzene hexachloride, paraquat and quinalphos suggested preventive measures in human exposure to work environment. Combined administration of endosulfan with metepa and parathion with lindane indicated some changes in the toxicity profiles.

The protective effect of barbiturates was determined on the levels of striatal acetylcholine and free ammonia and stimulatory effect of convulsions in *pp'*-DDT-treated rats. The results suggest that changes in the level of acetylcholine are not the cause but an effect of *pp'*-DDT-induced stimulatory effects of convulsions mediated through an increase in the level of free ammonia or some other mechanism.

Studies on the effect of di-2-(ethylhexyl) phthalate (DEHP) on glycogen metabolism in rat liver demonstrated that DEHP affects both glycogenesis and glycogenolysis. The plasticizer appears to exert its hepatotoxic effect by interfering with bioenergetics of the cell. Toxicity of DEHP was more pronounced in protein-malnourished rats. DEHP was also found to affect the ethanol metabolism. Metallized cellulose sheets screened for use, instead of aluminium foils, as tea chest liners for packaging tea leaves were found suitable.

Benzene, gasoline, iomex and petroleum ether altered the activity of alkaline phosphatase of liver and kidney of rats with a significant increase in liver lipid peroxidation. ^{59}Fe incorporation studies indicated a decrease in iron incorporation into circulating RBC and an increase in bone marrow iron contents in rats exposed to benzene and iomex. Three enzymes, namely *d*-ALA-synthetase, *d*-ALA-dehydratase and heme oxygenase of hepatic heme metabolism, were also studied in the liver of albino rats 3 and 20 hr after i.p. administration of benzene, gasoline and kerosene; benzene decreased hepatic heme concentration either by inhibiting *d*-ALA dehydratase or because of loss of heme following increase in lipid peroxidation, or by both counts. As part of a project sponsored by Indian Oil Corporation Ltd, biochemical examination of workers exposed to gasoline at Lucknow and Kanpur depots was undertaken.

Long-term chronic toxicity of metanil yellow on gastric mucin was studied. Experiments carried out on the extractability of metanil yellow indicated that the dye could not be completely washed out from legume and rice even after 30 washings with water, the samples containing about 30-40% adsorbed dye. Toxicity studies were carried out on 'orange II'. In an attempt to study the interaction of benzanthrone with skin, the melanocytes were separated. It was shown that riboflavin had no effect on

light-induced degradability of benzanthrone at any phase.

An outdoor Occupational Health Clinic was set up at Kanpur in collaboration with the Employees State Insurance Corporation. The clinic examines and diagnoses cases of occupational diseases, identifies the causative agents, and suggests measures for medical care and rehabilitation of disabled persons.

Sponsored schemes undertaken by the laboratory were related to toxicity evaluation of: water treatment chemicals (Indian Dyestuffs Industries, Kalyan and National Environmental Engineering Research Institute, Nagpur); single-cell protein from petroleum hydrocarbons (Indian Institute of Petroleum, Dehra Dun); packaging material for tea (Tocklai Experimental Station, Jorhat); Amaryl brilliant yellow 4G and Amaryl brilliant red 4G (Amer Dye-chem, Kalyan); non-soap detergents (Ministry of Industrial Development); and malathion (Chief Medical Officer, Lucknow).

During the period, 127 research papers and 10 review articles were published. □

Vegetable tanning process demonstrated

The Polytechnology Transfer Centre, Bhopal, organized in collaboration with the Central Leather Research Institute, Madras, a demonstration of an improved process for vegetable tanning of cowhides and buffalo light hides. Small-scale tanners, cottage-level tanners and entrepreneurs of the region witnessed the demonstration held from 23 March to 22 April 1982.

In the improved process, the hides are tanned by using locally available vegetable tanning materials like *ghatbore* (*Ziziphus xylopyra*) and myrobalan, the final tanning being completed with wattle extract and syntans, also produced indigenously. The process reduces the processing period from 65 days to 20 days and improves the quality as well as the yield of leather. By

adopting this improved process, tanners could obtain a higher price for tanned leather in addition to achieving higher productivity as a result of reduced processing period. □

IIP's List of Publications

The Indian Institute of Petroleum (IIP), Dehra Dun, has brought out a list of its publications since its inception in 1960 up to 1980. Classified under 14 main areas of research, the list contains 520 references to papers/reports published by its staff, besides 14 monographs/books/proceedings of seminars. The research output as indicated by the number of publications appears to be highest (109) in analyses and analytical techniques.

The publication (unpriced) is obtainable from: The Head, Coordination & Information Division, Indian Institute of Petroleum, Dehra Dun 248005. □

Capabilities of SERC-Roorkee

A booklet cataloguing the facilities, capabilities and expertise available at the Structural Engineering Research Centre (SERC), Roorkee, has been brought out. The centre is devoted to research and development in high-rise buildings, large-span structures, tunnelling and underground structures, and development of computer software for civil engineering applications. Sophisticated computer programs for structural analysis and design are available at the centre. The laboratory also accepts sponsored projects.

The 20-page brochure (unpriced) is procurable by writing to: The Director, SERC, Roorkee 247672. □

Materials Management in R&D

A course on Materials Management in R&D was held at the Central Food Technological Research Institute, Mysore, during 26 April-6 May 1982, in which 36 stores and purchase officers drawn from 27 CSIR laboratories, Defence Research & Development Organisation, Indian School of Mines

(Dhanbad), Space Applications Centre (Ahmedabad), National Institute of Virology (Pune), and Botanical Survey of India (Calcutta) participated. Aimed at developing an insight into various functions of materials management in R&D, the course, the fourth in the series, discussed the role of supervisors in the field. The faculty was drawn from the CSIR's Centre for Management Development in R&D, Administrative Staff College of India (Hyderabad), Indian Institute of Management (Bangalore), Army Headquarters, and Director General of Supplies and Disposals. □

Energy-efficient Design of Buildings

COURSE AT CBRI

Planning, design, construction and performance of buildings with regard to energy conservation and utilization of energy from renewable sources, including solar energy, was the subject of a workshop organized by Institution of Engineers (India) (Roorkee local centre) in collaboration with the Central Building Research Institute (CBRI), Roorkee, and University of Roorkee (UoR), during 31 March-8 April 1982. The faculty was drawn from CBRI, UoR, and School of Planning & Architecture, New Delhi. Besides, Prof. B.S. Saini of University of Queensland, Australia, who visited CBRI under the TOKTEN (transfer of know-how through expatriate nationals) programme, also delivered lectures. Fifteen participants—architects, planners and civil engineers from state and central government organizations—benefited from the course. □

PERSONNEL NEWS

Appointments/Promotions

Dr Asghar Husain appointed Distinguished Scientist

Dr Asghar Husain of the Regional Research Laboratory (RRL), Hyderabad, has been appointed Distinguished Scientist in the director's scale (12 May 1982).

Dr Husain (born 29 Aug. 1926) obtained his master's degree in applied chemistry from Osmania University, Hyderabad, and B.Ch.E. degree from University of Michigan, USA. From



1952 to 1958 he was with the Department of Chemical Engineering, University of Indonesia, Bandung, during which period he earned D.Sc. in chemical engineering. His thesis work on batch distillation finds place in the fourth and fifth editions of Chemical Engineers' Handbook (McGraw-Hill). After returning from Indonesia he worked for two years at the Department of Chemical Engineering, Delhi Polytechnic.

Starting his career with CSIR at RRL-Hyderabad in 1961, Dr Husain rose to the position of Scientist F in 1974, following a merit promotion in 1964 from position C to E. Since 1966 Dr Husain has been engaged in computer applications in chemical engineering, a field in which he has done pioneering work. He is co-author of a text-book 'Optimization Techniques for Chemical Engineers' (Macmillan Company of India, 1976) and editor of a manual 'Computer Programs in Optimization' published by McMaster University, Canada, where he served as Visiting Professor for a period of six months in 1978-79. He has to his credit a large number of research and review papers.

Participating in the Second World Congress of Chemical Engineering (1981, Montreal), Dr Husain presented a well-received paper on 'Modelling and simulation of ammonia synthesis loop' which was based on the work carried out

under his guidance for the Gujarat State Fertilizer Company, Vadodara, and which substantially increased the production capacity of its ammonia plant. His team is now engaged in process development, design of pilot and commercial plants, properties evaluation and determination, computer-aided modelling, simulation, optimization, and control. □

Dr V. Siddhartha

Dr V. Siddhartha of the Indian Space Research Organisation has been appointed Adviser at CSIR Headquarters, New Delhi (17 May 1982).

Dr Siddhartha obtained his B.Tech. degree from Indian Institute of Technology, Madras, in 1965 and postgraduate qualification in rocket propulsion from College of Aeronautics, Cranfield, Bedfordshire. In 1971 he earned his Ph.D. from Imperial College of Science and Technology for his studies in fluid mechanics. During 1972-73 he was Principal Scientific Officer at NCST Secretariat, New Delhi. He was consultant on information systems to the UN Environment Programme in Geneva for six months during 1973-74. He was a member of Systems Planning and Analysis Group of ISRO Headquarters at Bangalore before taking up the present assignment. □

Dr M.C. Upreti

Dr M.C. Upreti has been appointed Project Officer (Scientist EI), CSIR Polytechnology Transfer Centre, Lucknow (6 Feb. 1982). Dr Upreti joined CSIR as Scientist B in July 1969 at the Central Fuel Research Institute, Dhanbad, and later shifted on promotion as Scientist C to the Regional Research Laboratory, Jorhat, in February 1974. Prior to joining CSIR he had taught at Meerut College, Meerut, and Harcourt Butler Technological Institute, Kanpur.

Dr Upreti's main research activities are in surface chemistry in general, and catalysis and molecular sieves in

particular. Besides, he has worked on utilization of agro-industrial wastes and Assam coals.

Dr Upreti (born 14 July 1935) is a Ph.D. (1963) from the Indian Institute of Technology, Kharagpur. During 1963-66 he had worked as a postdoctoral fellow and research associate in USA. Has 15 papers to his credit. □

* * *

At the National Chemical Laboratory (NCL), Pune, the following have been appointed in the positions and with effect from dates given in parenthesis: Dr D.N. Deobagkar (Scientist C, 31 March 1982), Dr R.P. Singh (Scientist B, 28 Jan. 1982), Shri M.K. Dongare (Scientist B, 5 Feb. 1982), and Shri A.K. Srivastava (Scientist B, 8 March 1982).

Merit Promotions for participants in Antarctica Expedition

Scientists who participated in the first Indian Antarctica Expedition have been merit-promoted to the next grade. The scientists and the positions after promotion held by them are: Shri H.N. Siddiquie, Scientist F; Dr R. Sen Gupta, Scientist EI; Dr E. Desa and Dr A.H. Parulekar, both Scientists EI; Shri D.V. Rama Raju, Scientist B; Shri M.C. Pathak, Technical Officer; Shri S.G. Matondkar, Senior Technical Assistant; and Dr A. Sengupta, Scientist C. Excepting Dr A. Sengupta, who is with the National Physical Laboratory, New Delhi, all are with the National Institute of Oceanography, Panaji. □

Honours & Awards

Nehru fellowship for Prof. A.R. Verma

Prof. A.R. Verma, Emeritus Scientist, National Physical Laboratory (NPL), New Delhi, has been chosen for the Nehru Fellowship awarded by the Jawaharlal Nehru Memorial Fund. During the tenure of the two-year fellowship, which carries a stipend of Rs 3000 and an annual contingent grant of

Rs 10,000, Dr Verma will study the present measurement system in India including national standards of physical measurement, calibration, standardization and testing against different specifications. He will produce a monograph on modern standards and their relevance to India and recommend a structure for a national measurement system suitable for India, including instrumentation and system of secondary and tertiary standards, and test and calibration facilities.

For an account of Prof. Verma's scientific attainments, see *CN*, 32 (1982), 62. □

RRL-Jammu wins import substitution award

The Regional Research Laboratory (RRL), Jammu, was awarded second prize for import substitution at the 42nd All India Industrial Exhibition held at Hyderabad during the last week of January 1981. The award is for developing the process for producing gibberellic acid by submerged culture.

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

The Council of Scientific & Industrial Research proposes to appoint Scientists F in its various constituent laboratories. The respective discipline/area and the CSIR constituent laboratory as also the deadline for sending *curriculum vitae* are as follows:

Advt. No. 33/82: Airborne geophysical surveys, National Geophysical Research Institute, Hyderabad—22 July 1982.

Advt. No. 34/82: Industrial toxins, Industrial Toxicology Research Centre, Lucknow—5 August 1982.

Advt. No. 35/82: (two posts) for both the posts one or more of the following areas: Welding processes, Development of industrial machines, Materials science, and Fluid mechanics, Central Mechanical Engineering Research Institute, Durgapur—5 August 1982.

Advt. No. 36/82: (three posts)-(i & ii) Materials research and applications, and (iii) Radio science, National Physical Laboratory, New Delhi—5 August 1982.

The pay scale for these posts is Rs 2000-125/2-2500 plus allowances at the Central Government rates. Prescribed forms for sending the *curriculum vitae* are obtainable from the Chief (Administration), Council of Scientific & Industrial Research, New Delhi 110001, from whom further details regarding the above posts may also be obtained. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

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Turbocharger evaluation

At National Aeronautical Laboratory (NAL), Bangalore, a test facility has been made operational for evaluating turbochargers to assess the matched point operating parameters and to find out the individual component characteristics of compressors and turbines. The facility provides for entry and control of flow independently through the compressor and turbine of the turbocharger. The characteristics are obtained component-wise over a wider range. Corresponding turbine entry conditions in terms of pressure and temperature, for a required compressor boost, can also be evaluated by running the turbocharger under equal mass flow conditions. This avoids the costly exercise of testing the turbocharger in conjunction with the diesel engine with its simulated load at the operating point.

Such data are vital for ^{E.T.P.} upgrading or developing diesel engines for turbocharged applications.

The turbine parameter requirements are satisfied by suitably designing the valve timing and tuning the diesel engine so that a proper match of the turbocharger and diesel engine is obtained for efficient operation. Turbochargers have been evaluated in the rig for outside agencies on a sponsorship basis. The data obtained have been used to predict matched point requirements of the turbocharger at various boost pressures and mass flow rates of the diesel engine. □

Cascade tunnel for testing turbine and compressor blade profiles

A large transonic/supersonic cascade tunnel has been established and commissioned at National Aeronautical Laboratory (NAL), Bangalore, under an UNDP project. First of its kind to be built and commissioned in the country, the facility compares well with regard to its size with any such cascade tunnel available abroad. A noteworthy feature of the facility is that it can be deployed for testing turbine as well as compressor blade profiles.

The specifications of the facility:

Test section	: 150 × 500 mm
Inlet Mach No.	: 0.4 to 1.5
Reynolds No.	: 5×10^5 to 10^6
Blade chord	: 25 to 75 mm
Mass flow	: 50 kg/s
Storage pressure	: 10 atm
Running time	: up to 7 min
AVD ratio	: 0.8 to 1.2
Suction pressure	: up to 0.2 atm



Transonic cascade tunnel commissioned at NAL; it can be used for testing turbine as well as compressor blade profiles

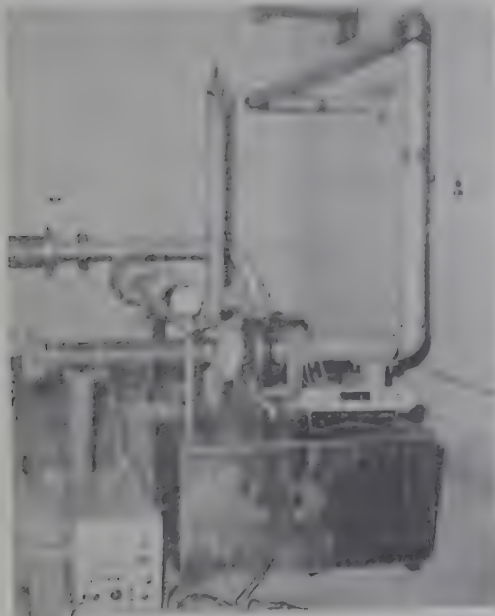
The desired velocity, static pressure and flow direction have been achieved in the initial calibration runs. □

Thermal stress index for office and factory workers

For designing buildings with an acceptable indoor thermal environment, it is necessary to determine a single index representing the influence of tempera-

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Turbocharger test rig at NAL for evaluating turbochargers

ture, humidity, radiation, and air movement on thermal stress of workers. The Central Building Research Institute (CBRI), Roorkee, had established earlier that for office workers the acceptable temperature ranges between 25° and 30°C at 50% relative humidity and nominal air movement. Extending the studies to industrial workers so as to obtain similar data for providing reasonable thermal conditions in industrial buildings, the institute has analyzed the data on subjective thermal response of workers in a few factories. The analysis shows that the acceptable level of thermal environment for industrial workers is different from that for office workers by as much as 2°C. □

Chemical investigation on Umbelliferae

Studies made by Shri B.D. Gupta at the Regional Research Laboratory, Jammu, on some plants belonging to the family Umbelliferae have revealed the presence of new chemicals. The roots of *Ligusticum elatum* yielded seven coumarins identified as selinidin, anomalin, pteryxin, epoxypteryxin, bergapten, and *cis*- and *trans*-khellactones. Three furanocoumarins, namely knidilin, xanthotoxin, and isopimpinellin, were isolated from the roots of *Selinum papyraceum*.

Three new coumarins, namely seselin, sesibiricol, and sibirinol, were obtained out of a total of fifteen coumarins from umbels of *Seseli sibiricum*. The new coumarins have been characterized as 5,7-dimethoxy-8-(2-methyl-2-formylpropyl)-1-benzopyran-2(*H*)-one, 5-(3-methylbut-2-enyloxy)-7-methoxy-8-(2-hydroxy-2-methylbut-3-enyl)-1-benzopyran-2(*H*)-one, and 5,7-dimethoxy-8-(2-hydroxy-3-methylbut-3-enyl)-1-benzopyran-2(*H*)-one respectively on the basis of chemical and spectral data and synthesis.

Twelve coumarins were obtained from the roots of *Heracleum thomsoni*, two of which were new. These were named as heratomin and HT3, and were characterized as 5-(3-methylbut-2-

enyloxy)-furo[2,3-*h*]-1-benzopyran-2(*H*)-one and 5-hydroxy-6-(1,1-dimethyl-2-propenyl)-furo[2,3-*h*]-1-benzopyran-2(*H*)-one respectively. Lanatin, one of the known coumarins, on Claisen rearrangement, gave interesting results. The benzene extract gave three known coumarins, viz. vaginidiol, heraclenol and 4-hydroxy-9-(1,1-dimethylallyl)-furo[3,2-*g*]-1-benzopyran-7(*H*)-one and two new coumarins, characterized as 5-hydroxy-furo[2,3-*h*]-19-benzopyran-2(*H*)-one and 6-hydroxy-furo[2,3-*h*]-1-benzopyran-2(*H*)-one.

Shri Gupta was awarded Ph.D. degree by University of Jammu for his thesis based on the studies. His supervisors were Dr C.K. Atal and Dr S.K. Banerjee, both of RRL-Jammu. □

New compounds from *Piper peepuloides* and *Psoralea corylifolia*

A new amide, piperamide, has been isolated from the leaves of *Piper peepuloides* by Shri B.K. Gupta at the Regional Research Laboratory (RRL), Jammu. The researcher also established its structure as 15-(3,4-methylenedioxyphenyl)pentadecapyrrolidine on the basis of chemical and instrumental techniques. From *Psoralea corylifolia* seeds, a new coumestan, psoralidin oxide, and a new chalcone, isoneobavachalcone, were isolated. The structures of the two compounds were established as 3,9-diacetoxy-2-(3'-methyl-2',3'-epoxy)-butanylecoumestan and 5'-formyl-4',4'-dihydroxy-2'-methoxychalcone respectively on the basis of spectral and chemical data. The structure assigned to psoralidin oxide was supported by its partial synthesis from psoralidine diacetate. Investigations on the essential oil from *P. corylifolia* seeds revealed the presence of limonene, γ -elemene, β -caryophyllene oxide, 4-terpineol, linalool, and geranyl acetate.

Another researcher from the same laboratory, Shri J.L. Suri, has isolated two new compounds, bavachromanol and psoralenol, from *P. corylifolia*. The

structure assigned to bavachromanol as 4,4',5'',5'''-trihydroxy-6'',6'''-dimethyldihydropyrano-(2'',3'':2',3')chalcone on the basis of spectral and chemical evidence was confirmed by total synthesis. Psoralenol was assigned the structure 7,5''-dihydroxy-6'',6'''-dimethyldihydropyrano-(2'',3'':4',3')isoflavone on the basis of physio-chemical data and it was confirmed by the synthesis of its 7-O-methyl ether from 7-O-methylnobavaisoflavone.

Shri Gupta and Shri Suri, who carried out the chemical investigations on pharmacologically active plants under the guidance of Dr C.K. Atal and Dr P.R. Rao, were awarded Ph.D. degrees by University of Jammu. □

Innovation problems in small scale and cottage industries of J&K state

The problems relating to non-adoption of innovations in small-scale and cottage industries of Jammu & Kashmir state have been studied by Shri B.S. Bakshi at the Regional Research Laboratory (RRL), Jammu.

The nature and the severity of problem reported by those who have not been able to adopt recommended innovations despite their willingness to do so, the study shows, is a function of a large number of factors: nature of industry, nature of innovations, and entrepreneurs' education, experience, social status, achievement, motivation and attitude towards science, scientists, related government departments and recommended new technologies.

An adverse combination of socio-psychological factors may result in an outright rejection of innovations by the industrialist; or, in other cases, an intending innovator may not be able to adopt innovation owing to technical and economic constraints encountered in a social, cultural, political, fiscal or an industrial climate.

In general, flourishing high-project industries and industries under the dominance of middlemen resist in-

novations because industrialists tend to exaggerate the element of risk capital for innovation adoption. Three main latent group structures of innovation rejectors have been identified as: (i) Dynamic entrepreneurs in sick industries who reject innovation ideas, as they consider it more useful to switch over to some better remunerative trade than adopting innovations; (ii) Producers who are either at the top or at the bottom of the industrial bureaucracy and who consider that recommended innovation is neither useful nor possible—they usually have vested interest against the innovations; and (iii) Producers who are either ignorant or have inadequate knowledge about innovations and the agencies which can help them innovate.

For his thesis based on these studies, made under the guidance of Prof. Inderjit Singh of University of Jammu and Dr C.K. Atal of RRL-Jammu, Shri Bakshi was awarded Ph.D. degree by University of Jammu. □

Physical properties of irradiated collagen fibres

Collagen, a fibrillar protein present in large quantities in connective and supporting tissues like skin, tendon, cartilage and bone, is the basic raw material for leather, gelatin and glue industries. Both *in vivo* and *in vitro*, collagen is exposed to various environmental conditions, one of which is irradiation with ultraviolet rays, gamma rays, electrons, and so on. The changes brought about in the physical properties of irradiated collagen fibres have been studied by Shri R. Balakrishnan of Central Leather Research Institute, Madras. The properties have been correlated with structural changes.

Acetone-dehydrated samples of collagen fibres from rat tail tendon (RTT) and kangaroo tail tendon (KTT) and elastoidin fibres from shark fins were irradiated with gamma rays and neutrons, both thermal and fast.

Crosslinking and molecular scission were the two major effects of irradiation on collagen. Crosslinking was pro-

minent at the initial stages and scission effects were dominant at later stages of irradiation. The changes in the mechanical properties were dependent on these two effects over and above the nature and dosage of the radiations used. Rehydration of the irradiated fibres aggravated the damage caused by the radiations. Shrinkage characteristics showed a similar behaviour, as confirmed by solubility changes. Irradiated fibres were found to absorb and retain less moisture. The kinetic parameters of sorption process, for instance heat of adsorption and surface area, also changed depending on the type and dosage of radiation. The characteristic banding pattern of the collagen fibres, when placed between two crossed polars, showed marked variations on irradiation. Observations with a scanning electron microscope showed the splitting, twisting and crimping caused by the radiations. UV absorbance and fluorescence spectra of the hydrolyzates of collagen fibres indicated the aggregation effects at the molecular level, caused by the radiations. A preliminary study on the effects of gamma rays on elastoidin fibres from shark fins showed that these have better resistance to radiations than RTT and KTT fibres.

Shri Balakrishnan, who carried out the studies under the guidance of Dr N. Ramanathan, was awarded Ph.D. degree by Madras University for his thesis based on the studies. □

PROGRESS REPORTS

IIP Annual Report: 1980

Development of technologies for efficient utilization and conservation of petroleum products and for production of petroleum chemicals and catalysts for use in petroleum refineries were the main areas of research of the Indian Institute of Petroleum (IIP), Dehra Dun, according to its annual report for 1980. Work undertaken included in-depth studies of combustion phenomena, new fuel induction system, and charge stratification. Considering the ever-increasing cost of petrol, the institute

made investigations on using alcohol/gasoline blends in spark ignition engines and on current makes of Indian cars. These studies established the feasibility of using these blends containing up to 20% alcohol. Attempts were being made on the use of alcohol in diesel engines.

Based on the studies carried out on a tractor diesel engine with a different location of combustion bowl in piston, the sponsoring company manufactured 500 units. The parameters studied by IIP included general engine performance, mechanical efficiency, and combustion pressure.

Basic studies on charge-nonhomogeneity within the combustion chamber of four-stroke engine on cycle-by-cycle variations by using gasoline, methanol and propane revealed: (i) charge-nonhomogeneity has a larger influence on overall lean-mixture strength as compared to rich-mixture strength, and (ii) duration of the initial phase of combustion has a large influence on cycle-by-cycle variability.

With a view to achieving fuel economy in two-stroke engine with a new fuel introduction system, experimental data on exhaust emissions and performance of a conventional two-stroke engine were collected and a method for circulation of short-circuiting charge was developed.

Prototypes of Nutan II stoves manufactured by Ashoka Metal Fabricators, Rajkot, and Optimohar Industries, Bombay, to whom know-how was released earlier, were tested and found satisfactory.

A low air pressure burner (capacity, 120 litres/hr) capable of operating 1:10 turndown ratio at 4-10% excess air was developed for burning HV-grade fuel oils. Long-duration trials of the burner at an industrial furnace were being planned. Also, at the instance of Bharat Heavy Electricals Ltd, a portable burner capable of burning 2 to 12 litres of light oils per hour was developed.

Bombay High crude was assessed for its potential for making food-grade hexane from its naphtha and detergent-

grade *n*-paraffins from its gas oils. The detergent-grade *n*-paraffins (nC_{10} – nC_{14}) were found to be in optimum concentration in 165–255°C fraction, the total availability being 2.56% by weight on crude basis. The denormalized portion of this fraction, after being blended with suitable Middle East crudes, could be used as illumination kerosene. A report was submitted to the industrial group for whom this study was undertaken.

The institute investigated the effect of flow improvers on transportation of crude through pipelines and submitted to the concerned oil companies a report on transportation of Bombay High crude to Koyali and Mathura. The study covered the basic and rheological properties of crude oils, characteristics of crude oil/blends after being doped with additives, and effect of aging.

In connection with the processing of Basrah crude (short residue) at Haldia Refinery's deasphalting unit for the manufacture of lubricating oils, investigations were completed. Data were also generated from engineering viewpoint and the number of stages in the propane deasphalting column was fixed. A report was submitted to the Indian Oil Corporation Ltd (IOCL).

In a project sponsored by Petroleum Processes Development Coordination Group, IIP has developed wax-deoiling technology by the use of an indigenously available solvent, methyl isobutyl ketone. A pilot plant for wax-deoiling has also been set up at the institute. The technology will go a long way in establishing the manufacture of aromatics and waxes in the country.

Visbreaking studies on North Gujarat short residue were done for IOCL in the bench-scale unit in the temperature range 475–485°C. The products—gas, light distillate and fuel oil—were evaluated. The pour point of the fuel oil (140°C+) was considerably reduced; however, its viscosity remained above the specified limits. A detailed report on this study was submitted.

IIP developed and transferred to Associated Cement Company the technology for the production of high-purity alumina supports for reforming catalysts. Scope for improvement existed in terms of structure, texture and bulk density as well as by way of promoters, and studies were envisaged to effect improvements while employing preparation methods directly translatable and usable by ACC, Bombay.

The institute took up a project in collaboration with the Central Institute of Organic Chemistry, Berlin, GDR, on the utilization of lower synthetic fatty acids of C_7 – C_{19} range as detergents.

Thirty-five papers were published; two patents were filed, and one patent was accepted during the year. □

SERC-Roorkee Annual Report: 1980-81

The annual report of Structural Engineering Research Centre (SERC), Roorkee, for 1980-81, shows that the major efforts of the centre were concentrated on high-rise buildings, large-span structures, tunnelling and underground structures, and computer software for civil engineering applications.

In the field of computer software the centre developed a general-purpose program package for uniaxial structures like curved bridges, flat-plate buildings and batteries of silos that facilitates optimization with minimum input data. Another notable effort in the area was the development of pre- and post-processors and a comprehensive package for matrix operations.

The centre continued its work on the development of transducers and allied equipment employed in the laboratory and field investigations on high-rise buildings. Transducers of various capacities to measure tensile and compressive forces and pressures were designed and fabricated. Their short-term behaviour, on evaluation, was found to be comparable with that of the expensive, imported models. A special sealing unit was designed to replace the

expensive hermetically sealed connectors to prevent moisture penetration through the connecting leads.

Trough-shaped ferrocement roofing units were evaluated for ultimate strength and performance under service loading. On the basis of the studies, certain modifications for the transverse reinforcements were made in the design. A cylindrical shell roofing unit was developed and displayed at an exhibition held in New Delhi. Tests on this unit were being carried out with a view to improving its design.

A gas holder for a 6 cm³-capacity biogas plant was designed. Two plants of this capacity installed at the officer's mess of Bengal Engineering Group & Centre, Roorkee, were working satisfactorily. The centre also developed a stirrer and a mixing tank for the slurry.

A 'Handbook for the limit state design of reinforced concrete members' was brought out. Containing more than 600 design aids and covering a wide range of parameters, the handbook would assist designers in the correct interpretation and application of the limit state criteria in the new Indian code.

The finite element study of box girder bridges was continued. The theoretical studies were supplemented with a model test on an extensively instrumented prismatic prestressed concrete box girder and the results were being processed.

A number of static tests in compression and shear were completed on elastomeric bridge bearings. Two special test assemblies for carrying out field tests on the bearings were designed and fabricated. A project proposal was submitted to the Ministry of Shipping and Transport for setting up an elastomeric bridge bearing testing laboratory.

Among the new projects taken up during the year mention may be made of those relating to: Strength of in-filled frames subjected to horizontal/vertical loadings; Linear static and dynamic analysis of multistoreyed buildings

subjected to lateral loads; Behaviour and design of composite steel concrete structural members; and Development of knock-type GI shed grain-storage bins. □

DEPUTATION BRIEFS

Dr B. Singh, Director, Central Mining Research Station (CMRS), Dhanbad, visited UK from 27 March to 19 April 1982 at the invitation of the British government to have discussions with the members of Association of British Mining Equipment Companies, Chief Inspector of Mines in UK and the officials of National Coal Board in London and Doncaster and of British Petroleum.

During his stay in UK Dr Singh visited health and safety laboratories at Sheffield, Buxton and London; Mining Research and Development Establishment of National Coal Board at Bretby; Department of Mining Engineering, Nottingham University; and Imperial College, London. He also visited the undersea coal-mine workings at Bates Colliery and Lynemouth Colliery. He also participated in a symposium on Strata Mechanics held at Newcastle upon Tyne where he presented four papers. □

Course on Petroleum Refining

A short-term training course in petroleum refining and petrochemicals, 12th in the series, was organized by Indian Institute of Petroleum, Dehra Dun. Held from 15 March to 21 May 1982, the course was attended by 44 chemical engineers from the refineries of Indian Oil Corporation Ltd. The topics covered included: refinery technologies, conservation of petroleum products, newer technologies for effluent treatment for environmental protection, and optimizing production planning of refineries. □

EXTRAMURAL RESEARCH

Combination chemotherapy for breast cancer

Inadequate literacy combined with lack of proper health education has contri-

buted to aggravating breast cancer to a level of malignancy where cure is out of the question. In the socioeconomic conditions obtaining in India, another factor that compounds the problem of breast cancer cure is the social stigma. In tune with the current thinking that breast cancer is a systemic disease from the beginning, efforts are being made to search for distant metastasis even if the primary is surgically curable. As a result, a multidisciplinary approach is put forward in the treatment of breast cancer. It is against this background that a CSIR research fellow, Dr V. Subramaniam, has attempted to evaluate the role of combination chemotherapy in the treatment of breast cancer, keeping in view the socioeconomic conditions prevalent in the country. The researcher studied a total of 17 cases from both premenopausal and postmenopausal groups with locally advanced and systemically metastasized breast cancer. All the patients were subjected to combination chemotherapy after elaborate investigations for metastasis and under laboratory haematologic control. Initially all were put on a combination of Cyclophosphamide, Methotrexate and 5-Fluorouracil (CMF regime), and those not responding or with progressive disease were put on Adriamycin and Cyclophosphamide (AC regime).

The study has revealed that, overall, complete response rate was 23.5% and partial response 70.5% with an objective response (sum of complete response and partial response) of 94%. The AC regime gave a better complete response (50%) than the CMF regime (15.5%); objective response was, however, better with CMF (92.3%) than with AC (75%). The AC regime being more expensive, the researcher rules out the use of this regime routinely.

The response in the postmenopausal group was better than in the premenopausal group. Locally advanced disease showed better response than the systemic ones.

Schirrous-type growths and growths with high lymphocytic infiltration showed better response than others. One case which showed progressive disease had poor lymphocyte infiltration.

Drug toxicity and resistance were the major limiting factors. In the AC regime, myocarditis and cardiomegaly were serious handicaps.

The relapse-free survival time ranged from 6 to 18 months with majority having more than 11 months.

The investigations were made under the guidance of Prof. N. Varadarajan at Stanley Medical College, Madras.

* * *

Frusemide aids in diagnosing pelvic-ureteric junction obstruction

Investigating the role of frusemide, a diuretic, in pre-operative and post-operative assessment of children with pelvic-ureteric junction (PUJ) obstruction, a CSIR postdoctoral fellow has come up with a valuable piece of information that frusemide-induced diuresis is simple, safe and non-hazardous and could provide illuminating evidence when ordinary urograms and renograms fail. The researcher, Dr Rekha Patnaik, studied 32 children (23 males and 9 females varying in age from 4 months to 11 years)—26 with suspected PUJ obstruction and 6 who had already been operated for the malady; the diuretic was used for pre-operative assessment in 18 children, post-operatively in 6 children, and both pre- and post-operatively in 8 children.

The study concludes that frusemide helps in the visualization of radiologically non-functioning kidneys, emptying out dilated hypotonic pelves and accentuating residual PUJ obstructions. The drug also helps in reducing transit time in non-obstructed, dilated renal pelves and improves the excretory phase of renograms in the absence of obstruction.

The importance of the study stems from the fact that PUJ obstruction

causing obstructive uropathy is common in children and infants, and delays in diagnosis may prove fatal.

The study was carried out under the direction of Prof. Subir K. Chatterjee at the Department of Paediatric Surgery of NRS Medical College, Calcutta. □

Vietnamese delegation visits NGRI

A four-member Vietnamese delegation of geologists led by Dr Tran Duc Luong, Director General, Geological Survey Department of Vietnam, visited the National Geophysical Research Institute (NGRI), Hyderabad, on 10 May 1982. The visit is a follow-up of the discussions held by an expert Indian mission which visited Vietnam recently to identify the probable area of cooperation between two governments in exploration/exploitation of minerals and other joint collaboration projects. Dr Hari Narain, NGRI's Director, held discussions with the Vietnamese delegation on the possibilities of technical cooperation. □

PATENTS INFORMATION

Indian Pat. 149580

(Application No. 535/Del/78)

Improved process for manufacture of membrane filter

M.V. Nanoti & P.M. Patni

National Environmental Engineering Research Institute, Nagpur 440020

Membrane filters are very useful in processes which require filtration with absolute retention of particulate matter on the basis of size. Purification and sterilization of heat-sensitive pharmaceuticals, and collection and analysis of heterogeneous components of various fluids, including aviation fuels and aerosols, are but two examples. Environmental pollution control and bacteriological examination of water and wastewater are the other areas where membrane filters play an important role.

Following the development of a process, now in production, for the

manufacture of membrane filters, National Environmental Engineering Research Institute (NEERI), Nagpur, has brought about improvements in the process. The improved process, covered by the patent, makes use of short-nep, high-bleached cotton in place of the high-quality long-staple cotton used in the earlier process. The earlier process involved purification to 95% α -cellulose content by alkali digestion and subsequent bleaching. Procurement of cotton on a small scale (about 200 kg) and steps involving purification and quality control were the factors which added to the cost of production. The present process overcomes the above drawbacks as the raw material required is readily available and does not require pre-processing.

Another improvement relates to the solvent system. The earlier process involved the use of ethanol in the solvent system. As it is difficult to get consistency in the quality of commercial ethanol, each lot requires to be purified. Also, ethanol being an excise-controlled item, its purification has to face the restrictions imposed. Procurement and processing of ethanol, therefore, make the commercial working of the process cumbersome and increase the cost of filters. In the present process, the solvent system consists of methyl acetate, *n*-butanol, glycerine, and demineralized water.

All the operations in the improved process are simple. Furthermore, there is no need for specialized machinery, the main units being those required for nitration of cellulose, and casting and drying of membranes.

Using laboratory glassware, a homogenizer and membrane casting chambers the institute has developed the process on a bench scale (1000 membranes of 47 mm diam. per day). The product has been tested for retention capacity. □

PATENTS FILED

Belgium Pat. 206896 (corresponding to Indian patents 585/Del/79 & 175/Del/

81): *d*- and *l*-Isomers of dl-3,4-*trans*-2,2-disubstituted-3,4-diarylchromans and derivatives thereof, their preparation and uses, Mohammad Salman, S. Ray, V.P. Kamboj & Nityanand—Central Drug Research Institute, Lucknow.

721/Del/81: Electrochemical preparation of *n*-butyric acid from *n*-butanol using nickel oxyhydroxide anode, H.V.K. Udupa, K.S. Udupa & D.C. Trivedi—Central Electrochemical Research Institute, Karaikudi.

251/Del/82: An acoustic liquid fuel burner, K.M. Swamy, K.L. Narayana & J.S. Murty—Regional Research Laboratory, Bhubaneswar. □

PERSONNEL NEWS

Appointments/Promotions

Dr Maheshwari is Scientist in charge of NBRI

Dr J.K. Maheshwari of National Botanical Research Institute (NBRI), Lucknow, has been appointed Scientist in charge of the institute effective 14 May 1982, consequent upon Dr T.N.



Khoshoo's taking over as Secretary, Department of Environment, Government of India.

An M.Sc. (1953) and Ph.D. (1957) in botany of Delhi University, Dr Maheshwari joined NBRI as Assistant Director in 1966. Earlier, he had worked in Botanical Survey of India (BSI) as Curator and as Systematic Botanist at Central National Herbarium, Howrah, and as Reader in Department of Botany, Delhi University. He was Joint Director of Central Botanical Laboratory, Calcutta, and simultaneously held charge of the office of Director of BSI from August 1974 to February 1977.

Engaged for over 30 years in research on Indian floristics, phytogeography, plant nomenclature, ethnobotany and conservation of phyto-resources, Dr Maheshwari has served as a member of several academic societies, study teams, scientific committees and organizations. In September 1975 he participated as a delegate in the twelfth general assembly and the thirteenth technical meeting of International Union for Conservation of Nature and Natural Resources (IUCN) held at Kinshasa, Zaire. He attended IUCN meetings in Morges (1976) and visited botanical research centres in Europe. In 1975 he was nominated a member of *IUCN Commission on Education (Morges) and a member of the board of advisory editors of *Environmental Conservation* (Elsevier). He participated in the International Legume Conference held at Royal Botanic Gardens, Kew, England, in 1978. He was appointed Visiting Professor in Department of Biology, Guru Nanak Dev University, Amritsar (1978). Founding the periodical *Journal of Economic and Taxonomic Botany*, he was nominated as its honorary chief editor in 1980. He is a fellow of National Institute of Ecology and a life fellow of Indian Society of Desert Technology.

Dr Maheshwari has to his credit more than 150 research papers, review articles and survey reports, and two books entitled *The Flora of Delhi* and *Illustrations to the Flora of Delhi*. □

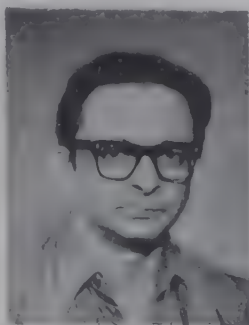
Dr P. Saha

Dr Prasenjit Saha has been appointed, on promotion, Scientist F at Central Glass & Ceramic Research Institute (CGCRI), Calcutta (26 April 1982).

An M.Sc. in geology of Calcutta University (1954) and Ph.D. in geochemistry of Pennsylvania State University, USA (1959), Dr Saha determined the structure of α -lead azide while doing postdoctoral work at the latter university.

With CGCRI since 1961, Dr Saha has made substantial contributions to

ceramic science and technology, which include: development of quartz monocrystals suitable for electronics industry;



suggesting mechanism for the formation of cellular structure in synthetic quartz; phase equilibrium studies and phase diagrams of ternary systems involving beryllia; structural classification scheme for natural and synthetic zeolites; and structure modelling of a large-pore molecular sieve zeolite. His current research interests relate to the development of communication fibres and upscaling the production of quartz monocrystals to semi-commercial stage.

A Visiting Professor to Japan in 1970 under a JSPS fellowship, Dr Saha also visited UK on an Indian National Science Academy-Royal Society fellowship in 1973 to carry out collaborative work on the system Fe-Ti-O and on magnesio-wüstite solid solution. Dr Saha is a fellow of Indian Institute of Ceramics, and a member of Indian Ceramic Society, of Indian Association for the Cultivation of Science, and of Society of Sigma Xi. He won Indian Ceramic Society's awards for 1975 and 1976. With 41 papers to his credit, he has also contributed a chapter on phase rule and phase diagrams in *Elements of Ceramic Science* (Vol. I). He is a national representative on an IUPAC commission. □

Dr J.G. Negi & Dr K.L. Kaila

Dr J.G. Negi and Dr K.L. Kaila have been merit-promoted to the position Scientist F at National Geophysical Research Institute (NGRI), Hyderabad (22 April 1982). Dr Negi is the area

chairman of Theoretical Geophysics group and Dr Kaila, of Deep Seismic Sounding and Seismicity group.



Dr Negi



Dr Kaila

Accounts of their scientific achievements have been published in *CN*, 31 (1981), 54 and 29 (1979), 47 respectively.

Dr D.C. Goswami

Dr D.C. Goswami of the Planning Division, CSIR Headquarters, New Delhi, has been appointed, on promotion, Scientist EI (Planning) at Regional Research Laboratory (RRL)-Jorhat (24 April 1982). He heads the Planning Division of this laboratory.

Dr Goswami (born 1 March 1949) obtained his B.Sc. (Hons) (1967) and M.Sc. (1969) degrees in physics, both first class, from Gauhati University, and associateship from Saha Institute of Nuclear Physics, Calcutta. He obtained Ph.D. (1976) from Gauhati University for his thesis on the correlation between the radiopulses and Cerenkov radiation emitted by extensive air showers of cosmic radiation.

Dr Goswami, who started his career as a lecturer in physics, joined Publications & Information Directorate, New Delhi, as Scientist B in 1976 and was a member of the editorial staff of *CSIR News*. He moved to Planning Division at CSIR Headquarters on promotion as Scientist C in 1979.

A popular science and science fiction writer, Dr Goswami has to his credit 10 books (in Assamese) and over 300 talks/scripts broadcast over All India Radio; he has won a national award and several other awards for science popularization. He translates science books for National Book Trust, and Publication

Board of Assam. He has also published 10 papers on cosmic radiation, science publishing, and planning of R&D. □

Shri H.L. Khurana, Finance & Accounts Officer, Publications & Information Directorate, New Delhi, has been promoted as Senior Finance & Accounts Officer (14 June 1982).

Honours & Awards

Prof. A. Rahman

Prof. A. Rahman, Director, National Institute of Science, Technology & Development Studies, New Delhi, has been made an honorary fellow of Science Policy Foundation Ltd, London. This honour is conferred on Prof. Rahman in recognition of his pioneer work in science and technology policy and the history of science and technology. □

For their paper 'Breeding of new type of *Ocimum gratissimum* for eugenol-rich essential oil' [*Indian Perfumer*, 24(11) (1980), 66], Dr S.N. Sobti, Dr P. Pushpangadan and Dr M.K. Khosla of RRL-Jammu have been awarded Dr D.R. Dhingra Memorial Award of Essential Oil Association of India. The paper has been adjudged the best paper on agricultural and related aspects of aromatic plants published in this journal in 1980. □

OBITUARY

Dr G.C. Jain

Dr G.C. Jain, Distinguished Scientist, National Physical Laboratory (NPL), New Delhi, passed away on 10 May 1982 while undergoing treatment in USA.

Joining NPL in 1966 as Scientist E in charge of the then newly created Division of Materials, Dr Jain rose to the positions of Scientist F (1970) and Distinguished Scientist (1979). His main thrust at NPL was on research, development and pilot production of electronic materials and carbon products. Using impure silicon (10 ppm of Fe) and directionally freezing it, Dr Jain

and coworkers developed silicon solar cells without a conventional antireflection coating. If today India is one of the few countries which have experim-



ented successfully with polycrystalline silicon for solar cells with efficiency of the order of 11%, the credit goes substantially to Dr Jain and his group.

Dr Jain also created a versatile team of experts in carbon technology at NPL. Using polyacrylonitrile (PAN), his group developed, for the first time, continuous carbon fibre with mechanical properties similar to those obtained by using costly PAN special acrylic fibre—a development which has resulted in cost reduction to a factor of 10, and opened completely new areas of the use of carbon fibres.

Prior to joining NPL, Dr Jain had worked as Senior Research and Testing Engineer at Siemens-Dynamowork, FRG (1954-59); Reader in electrical engineering at Roorkee University, Roorkee (1959-61); Assistant Professor of electrical engineering at Purdue University, USA (1961-64); and Associate Professor of electrical engineering at Rice University, USA. During his stay in USA he carried out research on unconventional methods of energy conversion and electrical engineering materials.

Dr Jain (born 2 Aug. 1931) obtained his B.Sc. with honours in physics (1951) from Panjab University securing first class first, and diploma in electrical technology (1954) from Indian Institute of Science, Bangalore, securing first position and a gold medal. He earned his doctorate in electrical engineering from Technical University of West Berlin.

An authority in semiconductor physics and electronic materials, Dr Jain had served on the semiconductor panel of IUPAP and was a member of IEEE and Sigma XI. He had been a consultant to several companies like Siemens, General Motors Corporation, and Borg Warner Corporation. As a UNIDO expert in 1979, he had assisted the Turkish government in setting up pilot plant facilities for electrical and electronics materials.

A fellow of Indian National Science Academy, Dr Jain had 80 research papers to his credit. He also authored several books and monographs, which include: Design, operation and testing of synchronous machines (Asia Publishing House, 1966); Properties of electrical engineering materials (Harper & Row, New York, 1967); Transport properties of solids and solid-state energy conversion (Tata McGraw Hill, 1972); and Development and manufacture of photovoltaic systems in developing countries (UN University monograph, to be published). □

ANNOUNCEMENTS

National Conference on Carbon (1982)

In collaboration with National Physical Laboratory, New Delhi, Indian Carbon Society will be organizing a National Conference on Carbon, from 15 to 17 December 1982. The conference will cover: Manufacture, characterization and applications of solid carbons, graphite and composites; Procurement and processing of raw materials; and Basic studies pertaining to structure and texture, carbonization/graphitization, surface complexes and surface reactions, and catalysis. Futuristic studies relating to raw materials and new forms of carbons will also be presented.

Those desirous of presenting papers at the conference should send full papers by 15 September 1982 to: Dr O.P. Bahl (Secretary, Indian Carbon Society), Carbon Technology Unit, National Physical Laboratory, Hillside Road, New Delhi 110012. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

VOL 32 NO 13 15 JULY 1982

Pilot plant for chemical demineralization of coal to be set up

An agreement for the setting up of a 3 tonnes per day (or 1 tonne per shift) pilot demonstration plant for chemical demineralization of coal at the works site of Premium Coke Manufacturing Company (PCMC) Pvt Ltd in Govindpur, Dhanbad, has been entered into by Central Fuel Research Institute (CFRI), Dhanbad, and PCMC. The chemical demineralization process which CFRI has developed was first successfully tried in a rigged-up plant of 150 kg per batch at Loyabad (Jharia coalfield) under the aegis of Bharat Coking Coal Limited (BCCL).

The process is technologically sound for commercial adoption, particularly because the byproducts along with the low-ash coal produced are of marketable quality. It can be utilized for producing tailor-made low-ash coal for the manufacture of carbon artefacts—electrode carbons—with less than 5% ash.

In the CFRI-PCMC unit, investigations on coals from selected areas of Jharia, Assam, etc. would be undertaken so that low-ash coal (up to 6% initially) could be produced. The institute would be particularly interested in carrying out exploratory investigations to study the prospects of demineralization of washery middlings and lower seams of Jharia coalfield. Ultimately, the demonstration unit of 3 tonnes per day would be scaled up to a 30 tonnes per day capacity plant. With increase in the plant size, the cost of production is expected to come down further. The entire mineral matter

would be converted into saleable chemical products like silica gel, aluminium sulphate and sodium sulphate, adding enormously to the economy of the process.

The project assumes great significance in view of the government's decision to continue to import coking coal at high cost.

The agreement was signed at a function held at CFRI on 8 June 1982 when its then Acting Director Shri B.K. Mazumdar presided. □

Fruit juice production process commercialized

The Central Food Technological Research Institute (CFTRI), Mysore, has developed several processes for producing fruit juice from pulpy fruits and for manufacturing soft drinks. So far, the technology for the production of fruit juice by the enzymic process has been released to nine firms. Five other firms have taken up the process know-how for the production of the pectinolytic enzyme used in the clarification of juice.

The latest to commercialize the CFTRI process for production of juices by enzymatic hydrolysis is a Delhi firm, The Midland Fruit and Vegetable Products (India) Pvt Ltd. The institute recently demonstrated the process and trained the technical personnel of the firm in the production of guava and banana juices. □

Quinalphos goes into commercial production

Based on the technology developed by Regional Research Laboratory (RRL), Jorhat, in collaboration with RRL-Hyderabad, a chemical unit, Sudarshan

Chemical Industries Ltd, Pune, has started commercial production of the broad-spectrum pesticide quinalphos.

The organophosphorus pesticide is both an insecticide and an acaricide. Its combined efficiency is being increasingly sought by the growers of cotton and sugarcane on which the use of an insecticide alone has caused subsequent damage owing to development of mites. Quinalphos is also widely used for protecting vegetables, paddy, tea, citrus fruits, and other crops. The pesticide is effective in the control of thrips, mites, ball worms, hoppers, borers and the like, and especially against diamond blackmoth. The estimated demand for this pesticide in the country is 1000 tonnes per annum.

The know-how of quinalphos was developed through extensive pilot plant investigations and the technoeconomic feasibility report was supplied to three parties for commercial utilization. Sudarshan Chemical Industries is the first party to successfully utilize know-how for commercial production. □

Computer program for evaluation of aerodynamic characteristics

For computing pressure distribution for transonic flow past swept wings, National Aeronautical Laboratory,

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Bangalore, has developed a FORTRAN-IV computer program—SWING 3.FOR—that can be run on a DEC-1090 computer. The three-dimensional small-perturbation equations with linearized boundary conditions, in the present program, are discretized by using a type-dependent finite difference approach and solved by the successive line relaxation method. The physical flow field, bounded internally by the wing and externally by infinity, is transformed analytically to a rectangular region with uniform spacings. The differential equation in the transformed plane is solved to get the potential distribution in the flow field and the pressure distribution on the wing surface. As a test case, a rectangular wing with NACA 0012 aerofil was considered and results were obtained for a coarse mesh size. Even for the coarse mesh the method could bring out the three-dimensional nature of the flow including the shock discontinuity. □

Ampoule-filling device for fumigants

A device for mass-filling of liquid fumigants like ethylene dibromide, ethyl formate, and acrylonitrile into glass ampoules has been designed by Central Food Technological Research Institute (CFTRI), Mysore. The device is capable of filling as little as 3 ml of the fumigant and as it operates under vacuum, the risk of exposure to poisonous vapours in the working area is eliminated. Moreover, it can be operated profitably even at a very low output of 1000 ampoules per day and is, therefore, ideally suited to small-scale industry, which cannot afford the high-speed, automatic strip-packing machines.

For releasing the fumigant slowly, the ampoule is wrapped first in an absorbent material, like filter paper, and then re-wrapped in a strip of corrugated cardboard, which is stapled together at the two ends. On breaking the ampoule, which can be done by a sharp tap on the outside of the package, the fumigant is

first absorbed on the filter and then slowly released through the cardboard package. CFTRI suggests that such a package could be useful for mini-fumigation of small stocks of food grains and seeds in rural and urban households. □

Choosing the right sand for masonry mortar

Investigations carried out at Central Building Research Institute (CBRI), Roorkee, will greatly aid field engineers in choosing right proportions of mortar mix according to the fineness modulus of sand available at site. For optimum use of masonry strength, a building scientist needs to measure the matching strength of mortar. The properties of mortar, viz. workability and strength, are greatly influenced by the type of sand used for mortar. With a view to studying the strength and workability of different mortars (recommended by IS:2250 for masonry), cubes of size (50 × 50 × 50 mm) were cast by CBRI in accordance with the procedure laid down in IS:516-1964. Two types of sands, i.e. river sand and quarry sand, were used. The mix proportion of the mortar was varied from 1:3 to 1:8 (cement:sand) in the case of plain cement-sand mortar and from 1:1/4:3 to 1:5/3:8 (cement:lime:sand) in the case of composite mortars. The fineness moduli (F.M.) of both types of sand were varied from 1.15 to 2.95. In all, 216 samples were cast and tested under compression in a Universal testing machine. The workability of each sample was also tested on a flow-table.

Plain cement-sand mortars with a sand of F.M. of 1.15 to 2.5 were workable. Beyond an F.M. of 2.5 the mortar bled. In composite mortars with a sand of an F.M. of up to 2.95, there was no bleeding.

River sand (rounded sand) provided 10 to 25% more compressive strength than quarry sand (angular sand) in the mix of the same proportion.

There was improvement of the order of 35% in compressive strength of

mortar cube on changing the F.M. of sand from 1.15 to 2.95 in the mix of same proportion.

Water requirement in the case of quarry sand was 5 to 10% more than for river sand, which resulted in higher strength with the latter one.

The presently available IS:2250-‘Mortar for Masonry’ has laid down minimum compressive strengths for different mix proportions where a sand of F.M. varying from 1.15 to 2.95 can be used.

The study carried out at CBRI provides data showing how F.M. and shape of fine aggregate affect the strength of mortars. Tables have been prepared which give strengths for different mix proportions for varying F.M. of sand from 1.15 to 2.95 (1.15, 1.45, 1.75, 2.05, 2.35, 2.65 and 2.95). □

CSIR laboratories celebrate World Environment Day

As in the previous years, this year also several CSIR laboratories celebrated the World Environment Day (5 June), prominent among them being Central Mining Research Station (CMRS), Dhanbad; National Environmental Engineering Research Institute (NEERI), Nagpur, and Publications & Information Directorate (PID), New Delhi.

At CMRS, the chief guest Shri B.R. Prasad, Chairman-cum-Managing Director of Bharat Coking Coal Ltd, expressed concern over the pollution level of Jharia coalfield. He also added that coal, which pollutes the environment to a great extent during production, during movement and during utilization, could be mined without damaging the environment with the available technology. Referring to Mukunda, which is going to be one of the large open-cast mines in Jharia coalfield injecting 5-10 tonnes of dust and 6-7 tonnes of sulphur dioxide, carbon monoxide and oxides of nitrogen and hydrocarbons every day, Prof. A.K. Ghose of Indian School of



At PID's function, Dr T.N. Khoshoo is seen giving a talk. To his left is Shri Y.R. Chadha, Chief Editor.

Mines, Dhanbad, called for adequate measures to combat pollution.

As a measure of abating environmental pollution in this coalfield, one of the speakers suggested that any project concerning this area should be accepted only when it would ensure minimum ecological and environmental protection. It was also suggested that steps should be taken to stop releasing effluents from coal washeries into rivers and burning coal in open *bhattas*. Setting up of smokeless fuel plants in the Jharia coalfield, management of the mines in conformity with the existing standards on air, dust and noise, and provision of occupational health services in mines, were some of the other suggestions made.

Dr K.A. Kini, Director, Central Fuel Research Institute (CFRI), Dhanbad, who also took part in the celebrations at CMRS, referred to the major contributions of his institute towards control of environmental pollution. He mentioned the following projects as of relevance to the pollution problem: oil agglomeration of coal; fluid-bed combustion of coal; bricks from fly ash and bottom ash of power stations; low-temperature carbonization process; and products like 'Jawala' from weakly coking coals. Besides, CFRI had projects like environmental safety, environmental planning and instrumen-

tation for analysis of pollutants, the director said.

Dr Kini also underscored the need to intensify the plantation programme to reduce the green house effect.

Celebrations at NEERI and PID were held on 4 June. NEERI's function was held in association with Nagpur University. Speaking at NEERI's function, Nagpur University's Vice Chancellor Prof. G.B. Kadam laid stress on the creation of public awareness about environmental pollution. He complimented NEERI for taking initiative in this regard.

The NEERI's Director, Dr B.B. Sundaresan, opined that the vast reservoir of scientific and technical personnel should evolve an environmental model which is best suited to the genius of India.

An exhibition of students' paintings and posters was also held at NEERI and prizes were given to six outstanding school and college students who participated in the drawing/painting and essay competitions.

At PID's celebration, the chief guest Dr T.N. Khoshoo, Secretary, Department of Environment, stressed the importance of 'collective cleanliness' for keeping the environment free from pollution. Pointing out that pollution in third world countries was due to poverty in contrast to pollution in advanced

countries, where the cause was affluence, Dr Khoshoo stressed the need for formulating strategies suited to combat pollution in developing countries, which, necessarily, would be different from those of the affluent nations. To mark the occasion, Dr Khoshoo planted a sapling of *Michelia champaca* in the PID/INSDOC campus. □

Building Architecture, Planning and Efficiency: CBRI's Exhibition

The Central Building Research Institute (CBRI), Roorkee, has been holding a two-month exhibition on Architecture, Planning and Efficiency of Buildings since 10 June 1982.

The exhibition was inaugurated by Shri J.R. Bhalla, President, Indian Institute of Architects, who, in his address, called upon scientists and architects to make major efforts for bringing about a breakthrough on the issue of human settlements. Complimenting the institute for its R&D work, which had won international recognition, Shri Bhalla said that CBRI had acquired substantial expertise which could be channelled towards the common goal of improving the living conditions of people, especially of those living in urban slums and squatter areas and in rural settlements.

The CBRI Director, Prof. Dinesh Mohan (who has since retired), made special mention of the roof surface evaporative cooling system, chimney designs for rural houses, and energy-efficient and economical designs of different types of buildings for rural health care and education.

Shri T.N. Gupta, head of CBRI's Architecture & Physical Planning Division, who also spoke on the occasion, mentioned the plans and designs of 19 types of health buildings like primary health centres, family welfare centres and midwife training centres which CBRI had developed and

which had helped the states of Karnataka and Uttar Pradesh in constructing hundreds of health buildings in rural areas. Economy in these buildings could be achieved to the extent of 20%, the CBRI scientist said, because of the institute's research findings. He added that the institute had undertaken R&D studies which had made it possible to put up thousands of efficient and economical school buildings in Uttar Pradesh, Punjab, Orissa, Manipur, Nagaland and Arunachal Pradesh.

Dr B.K. Saxena, head of the Building Efficiency Division, reviewed the institute's work on designing buildings for environmental comfort through proper orientation, thermal insulation, window design and noise reduction, and also for energy conservation in heating, cooling, lighting and ventilation of buildings. Besides providing data for design purposes, the institute had helped the building industry, the speaker said, by evaluating various insulating and acoustic materials. He pointed out that the ultrasonic concrete tester and the various types of solar water heaters developed by the institute had been commercially exploited.

For cooling buildings in a hot, dry climate, he said, the institute had developed a roof surface evaporative cooling system, which had been successfully implemented on RCC roofs of industrial buildings at Bharat Heavy Electricals Ltd, Hardwar, and at Panjab University, Chandigarh. The institute had provided guidelines and design data for cold storages for residential, educational, office and commercial buildings as well as for industrial buildings. Based on CBRI's work, Indian Standards Institution was publishing a handbook on Functional Requirements of Buildings. Dr Saxena quoted several national building codes and codes of practice which had incorporated the research results from the institute.

Such exhibitions are held by CBRI from time to time to familiarize practising architects, engineers and

builders with the recent work of the institute with a view to bridging the gap between research and its application. □

Science and Technology in Medieval India

Certain distortions of the contemporary history of science, such as the one projecting science and technology as a European phenomenon, have been exposed in a recent publication entitled 'Science and technology in medieval India: A bibliography of source materials in Sanskrit, Arabic and Persian'. Compiled by Prof. A. Rahman of CSIR and associates, this bibliography of historical literature and manuscripts on science and technology explodes several myths perpetrated by European scholars. For instance, it is widely known that during the industrial revolution, European scholars not only got access to Arabic, Persian and Sanskrit manuscripts on science and technology, they also translated them into English, and, deplorably, published them under their authorship. Covering

literature mostly from the tenth to nineteenth century, the book unfolds the political objective of European scholars to belittle the intellectual capabilities of the people other than of the European culture areas to serve their aim.

Among the other revelations by the book: Throughout the medieval period the scientific and technological activity, judged by the number of manuscripts, was both continuous and vigorous. Though the contributions were principally in astronomy, mathematics and medicine, they spread over a wide range of scientific and technological subjects. Treatises of special nature were more in number in contrast to contributions of general nature. Furthermore, the period reveals the preponderance of dictionaries and encyclopaedias.

The publication was released by the Prime Minister Smt. Indira Gandhi at a function held at her residence on 3 June 1982. Complimenting Prof. Rahman and coauthors for their work in bringing together scientific and technological



The Prime Minister Smt. Indira Gandhi released the bibliography on Science and Technology in Medieval India. To her right is Prof. M.G.K. Menon, President of INSA. The principal author Prof. A. Rahman is at the extreme left, and to his left is Shri A.K. Bose, INSA's Executive Secretary.



At the felicitation function held at CSIR Headquarters: (from left)—Dr G.S. Sidhu, Prof. M.G.K. Menon, Prof. S. Nurul Hasan, and Prof. A. Rahman (speaking).

literature at one place to enable scholars to pursue their study, the Prime Minister described the publication as 'a great gift to the country'. Religion, philosophy and science and technology, she emphasized, were part of the Indian culture and scholars should study all the dimensions of our culture.

At another function held at CSIR Headquarters the same evening, Prof. S. Nurul Hasan, the CSIR's Vice President, Dr G.S. Sidhu, Director General, and Prof. M.G.K. Menon, President of Indian National Science Academy, all complimented the authors for their monumental work. Prof. Nurul Hasan described the publication as a great aid to scholars to study in depth the country's rich tradition of science and technology which had been neglected by scholars of geography, history, and science and technology.

Expressing his view that Indian science had never been given its due credit on the world scene, whether it is the work done in historical times or that of the current period, Prof. Menon congratulated the authors 'on the very careful and laborious task' in producing the book which corrects the distortions made by European scholars. Prof. Menon also spoke of Prof. Rahman's

contributions, besides the history of science, in technological planning of scientific research, problems of management of R&D institutions, science policy studies, and ethical and philosophical studies.

Dr Sidhu echoed the sentiments expressed by the Prime Minister earlier in the day when she described her task of releasing the book as 'a wonderful way of starting the day'.

Prof. D.S. Kothari, the eminent physicist, was among those who congratulated Prof. Rahman and coauthors for the excellent source book on Indian medieval science.

This massive work, started in 1951 and completed in 1966, is organized language-wise, subject-wise and period-wise. As the historical literature and manuscripts on science were scattered in a large number of libraries, archives and private repositories in India and abroad, the compilation was a stupendous job, as speaker after speaker emphasized.

The bibliography [720 pages, demy4to, Rs 200 (\$70.00)] has been compiled under the auspices of Indian National Science Academy through the Indian National Commission for the Compilation of History of Science. □

PROGRESS REPORTS

CFTRI-Mysore

Annual Report: 1980-81

The annual report of Central Food Technological Research Institute (CFTRI), Mysore, for the period 1980-81, brought out recently, shows that 42 projects were initiated and 52 projects were concluded by the laboratory. Work was also under way on 8 sponsored projects. Thirteen processes were released to 19 parties. The institute's processes on protein chewy candies, orange- and lime-flavour blends, cocoa mass and tamarind powder were commercially exploited and the products marketed. The second energy food unit, financed by the Karnataka government, was commissioned at Belgaum; installation of units at Raichur and Chitradurga was also completed. A manufacturing unit for spice oleoresins was established by a private industry at Nagpur with CFTRI know-how.

The institute won the Indian Merchants' Chamber Award for outstanding contributions to the development of post-harvest technology for efficient processing and conservation of food. The institute's technology on dehydrated green pepper won for its team of workers responsible for the technology an award from the National Research Development Corporation of India.

Under the Technical and Economic Cooperation Programme of the Indian government, Miltone and orange concentrate plants were set up and commissioned by CFTRI in Burma. A programme on low-cost weaning food formulation and distribution in Nepal was developed by the institute under an WHO assignment. CFTRI scientists assisted Sri Lanka and Indonesia in processing spices and setting up a food technology centre respectively.

Consultancy assignments completed were concerned, among others, with status report on tapioca industries in Tamil Nadu; techno-economic feasibility report on soyabean complex in Uttar Pradesh; compatibility and

extractability of Indothene for packing milk; fruit and vegetable processing problems; and ready-to-serve beverages.

Detailed investigations were undertaken on the toxicity of Durobase oils (CFTRI products), DDVP and Aldrex by using Albino rats and poultry. The uptake of hexachlorocyclohexane (HCCH) by *Amaranthus* roots, knolkhol, chillies, cucumber and tomatoes was studied and it was found that its residual levels do not exceed the tolerance limits, namely 3 ppm established for human consumption. Studies on grain protectants were carried out. Bromophos was found to be effective against five of the most common storage pests, and certain edible vegetable oils against *Callosobruchus chinensis*.

Of great significance in the biological control of pests is the development of an easy method for *in vivo* production of spores of *Bacillus thuringiensis*. These are effective against lepidopterus pests of food grains without harmful effects on economically important insects.

Salt treatment was found to be very effective in preserving wet paddy for about two months, a process which did not affect the smell, milling behaviour, and cooking qualities of paddy. A mini roller flaker was fabricated to improve the yield and quality of *avalakki* (beaten rice). The roller flaker was also found suitable for flaking jowar. A new weaning food (PER 2.7) which can be prepared even in households has been formulated.

Enzyme-modified groundnut flour made by using a commercial enzyme protease and papain was prepared in 5 kg and 10 kg batches and successfully used in the production of biscuits (about 12% protein) and candies (up to 20% protein) to confirm the earlier findings. Incorporation of mustard protein concentrate (MPC) in biscuit formulations to raise their protein level to 12% did not affect organoleptic qualities. Three weaning food recipes have been formulated by using MPC with cereals and pulses.

Fumigation of sal seed with ethylene dibromide was found to prevent insect infestation during storage (25-32°C) and also FFA development.

Three different beverages have been prepared from cashew apples stored for 48 hr by the chemical treatment developed earlier. These beverages store well for more than two months at room temperature. The product based on a blend of cashew apple-pineapple proved most acceptable. A ready-to-serve beverage concentrate which remains acceptable for 6 months at room temperature has been prepared from comminuted Malta oranges grown in Punjab.

Mini abattoirs capable of handling small numbers (10-20) of animals and useful for small towns have been designed. A new technique of cutting frozen blocks of thermal-processed fish to avoid cutting losses in the preparation of breaded fish has been developed.

A prototype of extrusion press has been fabricated for the extraction of cocoa butter from refined cocoa mass.

Commercial production of orange/lime flavoured beverages was started during the year; the process know-how for carbonated coffee flavour was ready for commercial release. Deterpenated ginger oil was found to be an acceptable and stable flavour ingredient in the preparation of carbonated ginger beverages.

Studies were started for extracting colour from *dhal* husks and information was generated on the tinctorial power of colour from fresh *kokum* fruits and enzyme-treated grape colour concentrate. The process details for the extraction of natural colorants (grape skin, beetroot and safflower) are ready for commercial exploitation.

A fraction separated from *Rhizopus oligosporus* protease by using an indigenous cationic resin proved effective in producing cheese comparable to that obtained by using calf-rennet. A quick-setting (2-4 hr) curd similar to the traditional product (which sets in 16 hr) and a nutritious/acceptable product

'curd candy' are new products developed during the year.

Trials continued on the processed food items packed in tin-free steel cans have shown that potato and fish remain acceptable for 9 months, ivy gourd for 6 months and mango juice up to 6 months under specified conditions. The mechanism of corrosion in the combinations of tin-plate and tin-free steel in the presence of fruit and vegetable products was being studied.

The chemical and structural make-up of carbohydrates from field bean husk and endosperm have been elucidated. The gum from 'Durgapur Saphed' variety of guar seed was isolated and purified. Data were obtained on its viscometric and viscoamylographic features with starches and other hydrocolloids.

Fats of mango kernel and *kokum* showed lower digestibility (65 and 55% respectively) than hydrogenated vegetable oil. At 10% level, *kokum* fat adversely affected rat growth, but mango kernel fat had no deleterious effect on growth.

Hospital trials have shown the effectiveness of infant food formulations containing 22% or 11% protein in improving the children's immunological status. In another trial, weight gain and blood composition of babies fed the weaning food based on ragi and green gram for 6 months were comparable to those fed a proprietary food.

Biochemical changes produced by beta- and gamma-isomers of BHC have been investigated in detail. □

EXTRAMURAL RESEARCH

Physiological effects of colchicine in plant systems

The effect of different concentrations of colchicine on growth of rice and *mung* bean seedlings has been studied by Dr (Smt) Tapati Sengupta, a CSIR postdoctoral fellow. The study showed that in both cases, inhibition of both root and shoot growth was directly proportional to the increase in the

concentration of colchicine. It also caused a marked swelling of the shoot portion and blunting of roots, particularly with higher doses. The drug enhanced protochlorophyllide content in primary leaves of *mung* bean seedlings. On soaking the primary leaves in colchicine solution for different periods, the drug favoured the conversion of protochlorophyllide to chlorophyll and synthesis of chlorophyll in primary leaves, which was directly proportional to the period of incubation, with a maximum increase of 32% after 24 hr. Colchicine increased the activities of the enzymes involved in chlorophyll synthesis in *mung* bean leaves but reduced the activity of chlorophyllase. In rice leaves, it stimulated the formation of chlorophyll and xanthophyll.

The chlorophyll levels increased to 38-40% over those of control seedlings following colchicine treatment. Chlorophyll synthesis in excised as well as intact cotyledons of *mung* bean seedlings grown in colchicine medium was significantly enhanced by treatment. Its promoting effect further increased when used in combination with benzyladenine. Colchicine helped maintain chlorophyll levels in isolated leaf discs of *Cephalandra indica* better than water could and there was a simultaneous increase in Hill activity in the leaf discs as also in intact rice leaves. A drastic reduction in respiration rate, with a maximum of 40% at a dose of $6 \times 10^{-4} M$ colchicine solution, took place in rice seedlings.

The RNA and DNA contents of both rice and *mung* bean seedlings showed a tremendous increase over control value after colchicine treatment. The protein content showed a steady decrease. Incorporations of [^{14}C]uracil and [^{14}C]thymine into corresponding nucleic acids were stimulated by treatments with colchicine. RNA synthesis rate was directly proportional to the incubation period, while in DNA synthesis, maximum promotion was observed at the second stage (3rd hr) of incubation.

The studies were made under the guidance of Dr S. Mukherjee at Department of Botany, University of Calcutta, Calcutta. □

DEPUTATION BRIEFS

Dr S. Mallick of the International Hydrological Programme Unit (CSIR) participated in the Unesco-sponsored international workshop on 'Comparison of application of mathematical model for the assessment of changes in water quality in river basins, both surface and groundwater' held at La Coruna, Spain, during 19-23 April 1982. About 40 scientists, mostly from developed countries, participated and 23 papers were presented, reports Dr Mallick. The CSIR scientist presented a paper on 'A simple mathematical model for the prediction and control of non-point nitrogen pollution of shallow aquifer due to agricultural activities in Indo-Ganga plain, India'.

Dr Mallick was also a member of the drafting group for groundwater which framed recommendations for follow-up action by Unesco. □

PERSONNEL NEWS

Appointments/Promotions

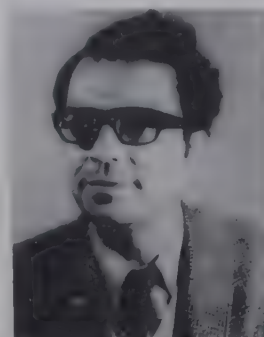
Dr V.C. Vora appointed Project Officer of IMTGE

Dr V.C. Vora, Scientist F, Central Drug Research Institute (CDRI), Lucknow, has been appointed Project Officer (22 April 1982) of Institute for Microbial Technology and Genetic Engineering (IMTGE) being set up at Lucknow.

Dr Vora (born 10 Oct. 1925) did his B.Sc. (Hons) from Bombay University (1945), B.Sc. (Tech.) in pharmaceuticals and fine chemicals (1947) from University Department of Chemical Technology, Bombay, and Ph.D. (1951) from London University, UK. Dr Vora's doctoral work was in chemical microbiology, which he carried out under the guidance of Prof. H. Raistrick, F.R.S., in the Department of Tropical Medicine, London. On his return, Dr Vora worked for a short

while in a pharmaceutical concern and joined CDRI in 1952.

At CDRI, Dr Vora has been responsible for building up a team of



research workers in applied microbiology/fermentation technology. Among his important contributions at this laboratory mention may be made of the process development for the production of acetylphenylcarbinol and its conversion to *l*-ephedrine hydrochloride, a process which has been licensed to a few firms in India. He also holds a joint patent for an antifungal antibiotic, UNI-36, which is likely to go on stream shortly.

During 1967-68, he worked as a guest research worker with Dr Olof Ceder in Organic Chemistry Institute, University of Gothenberg, Sweden, on the structure of a polypeptide antibiotic. He studied the chemistry of made black tea, with Prof. W.D. Ollis, F.R.S., at University of Sheffield, UK (1968-69).

Dr Vora has been associated with a number of review committees, professional bodies and others: member, Tea Research Review Committee (1976); president, Association of Microbiologists of India (1981); director, Hindustan Antibiotics Ltd (1976-77); chairman, Task force on national antibiotics policies (ICMR, 1980) and, member-secretary, CSIR committee for the preparation of a feasibility report for the setting up of an institute of applied microbiology (1981-82). Has 50 research papers to his credit, besides a status report on applied microbiology in CSIR laboratories and another on applied microbiology in India. □

Dr A.P.B. Sinha appointed Distinguished Scientist

Dr A.P.B. Sinha of National Chemical Laboratory (NCL), Pune, has been appointed Distinguished Scientist in the director's scale (12 May 1982).



Dr Sinha (born 27 Dec. 1928) has had a brilliant academic career. After obtaining B.Sc. (1948) and M.Sc. (1950) degrees in first class from Patna University, he earned his Ph.D. (1954) from London University, UK, for electron diffraction studies in thin films of chalcogenides. He is recipient of as many as five gold medals for standing first at the various university examinations.

Joining NCL in 1955 as a Junior Scientific Officer, Dr Sinha steadily rose to the position of Scientist F. He headed the Inorganic Chemistry Division from 1963 to 1979 and has been heading the Physical Chemistry Division since 1976.

Dr Sinha has established at NCL a school of solid state chemistry engaged primarily in the synthesis of new materials and study of their physical properties—a programme which has produced several useful products, such as thermistors, magnets, photocells and varistors, for the electronics industry.

Dr Sinha has done pioneering basic work in spinels containing Mn^{3+} ions. Studies on a series of new manganites synthesized by him have led to the understanding of the subject. New types of spin alignments in ferrimagnetic as well as antiferromagnetic manganites have been identified. Most of these manganites have been found to be good semiconductors.

While studying thin-film hetero junctions, he discovered an interesting switching and memory effect, a finding which is now being extended to semiconductor electrolyte junctions. He has also synthesized more than 50 europium chelates and studied their emission characteristics under optical excitation with a view to examining their potentiality as laser materials. He is currently engaged in the application of photoelectron spectroscopy with a view to understanding the transition metal oxide systems.

A fellow of Indian National Science Academy, Dr Sinha is recipient of a number of awards: Shanti Swarup Bhatnagar Prize (1972) in chemical sciences, and NRDC Independence Day Award (1978) for his meritorious invention relating to radiosonde thermistors technology. He is also a fellow of Indian Academy of Sciences and of Maharashtra Academy of Sciences, and a member of several national and international committees on material sciences. □

PATENTS FILED

22/Del/82: A process for the synthesis of alkyl 5(6)-carboxamidobenzimidazole-2-carbamates, S. Kumar, A.P. Bhaduri, P.K.S. Visen, S. Ram, S. Gupta, J.C. Katiyar & A.B. Sen—Central Drug Research Institute, Lucknow.

37/Del/82: Anti-bumping devices used in chemical unit operations involving boiling of liquids, N.M. Umamathy—Central Electrochemical Research Institute, Karaikudi.

38/Del/82: An improved electrolytic process for the pretreatment of titanium base metal substrate for coating by electrodeposition thermal or chemical operations, H.V.K. Udupa, M. Nagalingam, N. Thiagarajan, S. Pushapavanam, M. Sadagopalan, R.G. Palanisamy, N.S. Rao & V. Rangarajan—Central Electrochemical Research Institute, Karaikudi.

39/Del/82: Process for the preparation of an active principle of a plant

Ferula jeschkena useful as abortifacient compound, G.K. Jain, B.S. Aswal, B.N. Mehrotra, D.N. Gupta, B.S. Setty, J.P.S. Sarin, V.P. Kamboj & N.M. Khanna—Central Drug Research Institute, Lucknow. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Advertisement No. 37/82

The Council proposes to appoint Director for its National Botanical Research Institute (NBRI), Lucknow.

NBRI is engaged in research and development in applied botany with reference to utilization of non-traditional/under-utilized economic plants through introduction, domestication, conservation, protection, utilization, genetic upgrading and propagation, and development of production technologies for newer plant resources, as also botany in relation to environment and energy. This involves high-level basic and applied botanical and phytochemical researches; demonstration and extension of technical know-how; and collection and dissemination of information. Of current interest at NBRI are: algal biotechnology; tropical mushrooms; aerobiology; pollution tolerance/resistance in plants; biomass production for firewood, alcohol and hydrocarbons on marginal soils; newer sources of seed gums and mucilages, proteins and non-edible oils; standardization of indigenous herbal drugs and their formulations; subsidiary foods; ethnobotany; betel vine; ornamentals; and taxonomy and morphology of lower plants.

Qualifications: High academic and research attainments in any branch of botany. The incumbent must be able to provide high-level leadership in the formulation of multidisciplinary research and development programmes and projects, and organizing and coordinating team work to secure progress in the attainments of the objectives of the institute. He will have the overall responsibility for the work of the institute and for maintaining an atmosphere conducive to creative work.

Age: Below 50 years, relaxable in deserving cases.

Scale: Rs 2500-125/2-3000 plus allowances at the Central Government rates. Higher initial pay can also be considered. Consultancy fees subject to an upper limit of Rs 15,000 per year is permitted. This is a contractual appointment for six years but the contract is renewable and the incumbent can also be confirmed.

Those interested are invited to send their curriculum vitae on or before 5 August 1982 in the standard proforma obtainable from the Chief (Admn), Council of Scientific & Industrial Research, Rafi Marg, New Delhi 110001. Annual reports and brochures relating to NBRI will be provided on request. □



CSIR NEWS

Information Service
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CSIR Society Reconstituted

The Society of Council of Scientific and Industrial Research has been reconstituted with effect from 6 June 1982 for a period of two years, and consists of the following:

President

Prime Minister

Vice President

Prof. S. Nurul Hasan

Members

Shri Vasant Sathe

Minister of Information &
Broadcasting

Government of India
New Delhi

Shri N.D. Tiwari

Minister of Industry
and Steel & Mines

Udyog Bhavan
New Delhi

Shri S.B. Chavan

Minister of Planning and
Deputy Chairman

Planning Commission
Yojana Bhavan
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Technology, Electronics, and
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Government of India
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Kothi No. 4, Sector 5
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Dr V.S. Arunachalam

Director General
Defence Research & Development
Organisation
New Delhi

Dr P.P. Gupta

Secretary to the Government of India
Department of Electronics
Lok Nayak Bhavan
New Delhi

Prof. C.N.R. Rao

Solid State & Structural
Chemistry Unit
Indian Institute of Science
Bangalore

Dr Gurbaksh Singh

Vice Chancellor
Delhi University
Delhi

The following members of the
Governing Body of CSIR shall be
members of the Society (CSIR) for the

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Perspectives on Aircraft Aerodynamics

Symposium at NAL

The symposium on Perspectives on Aircraft Aerodynamics, sponsored by Aeronautics Research and

Development Board (ARDB), and held at National Aeronautical Laboratory (NAL), Bangalore, from 26 to 29 May 1982, provided a forum for users, designers, and research workers to discuss the present status in India in selected areas of aircraft aerodynamics, present and future needs, and formulation of an R&D programme.

Air Chief Marshal Dilbagh Singh, Chief of Air Staff, outlined in his inaugural address the nature of the vital stake of the Indian Air Force in aircraft aerodynamics. Shri A.V. Ranga Rao, coordinator of the aerodynamics panel of ARDB, explained the background. Dr S.R. Valluri, NAL's Director, stressed the necessity of an aircraft project for energizing indigenous technology development in aeronautics. Shri Vivek Sinha dealt with ARDB's role in aeronautics in India.

The scientific programme, formulated by the programme committee appointed by the aerodynamics panel of ARDB, consisted of three main areas: Flight Mechanics and Research (2 sessions); Aerodynamic Configurations (4 sessions); and Aerodynamics of High-Lift and Control Devices (1 session). These sessions were preceded by a session on general aircraft requirements and followed by a final discussion session.

Air Marshal C.V. Gole, Deputy Chief of Air Staff, gave, in the first presentation in the general session, an exposition of how the Air Force views the entire spectrum of its long-term aircraft requirements. Shri Raj Mahindra, Managing Director (Design and Development), Hindustan Aeronautics Ltd, emphasized the need for inducting advanced technology in aircraft production.

In the final discussion session, chaired by Prof. R. Narasimha, there were many exchanges of views on the proposed LCA programme, its relation to the formulation of R&D plan in aeronautics, and the need for new facilities.

Some 170 delegates from the Air Force, HAL, R&D laboratories, and

academic institutions participated in the symposium. □

Profile projection objectives

The design, development and prototype fabrication of five objectives of specifications 175 mm, 10×; 90 mm, 20×; 74 mm, 25×; 38 mm, 50×; and 19 mm, 100×, covering a screen size of 500 mm and keeping in all cases object-to-image distance as 2057.4 mm have been completed by Central Scientific Instruments Organisation (CSIO), Chandigarh. The objectives provide excellent image definition and yield a measuring accuracy of 5 μm. The project was sponsored by Madras Dial Gauges & Measuring Instruments Co. (MAGAMI), Bangalore.

To meet the standard requirements and working convenience, the designs have been so developed that the back-to-equivalent focal length ratio is about 1.5 in the case of 20× and 25× objectives and 2.3 in the case of 50× and 100× objectives. To achieve this, distortion-free inverted telephoto construction was chosen, which made the task of designing these objectives complex and difficult.

The performance of each of the above objectives has been critically checked by the sponsor and has been found to be equivalent to that of the imported Dallmayer lenses.

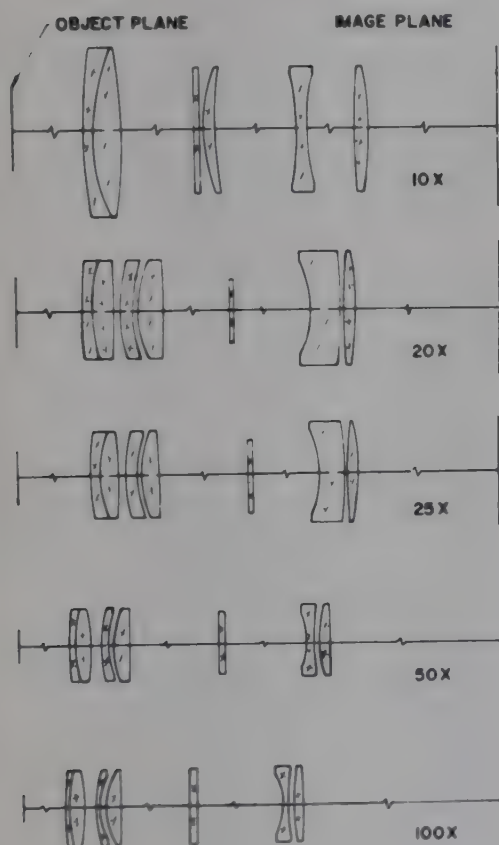
It might be mentioned that on enquiry by MAGAMI, in 1974, Sira Institute of UK had quoted a fee of £ 12,000 to complete the optical design and tolerancing of 5, 10, 20, 25, 50 and 100× profile projector lenses and condensor plus a sum of £ 10,000 for three sets of prototype lenses for each of these systems. The cost of the individual process lenses manufactured subsequently was likely to be in the range £ 100-1000.

The indigenous design and development of the complete range of profile projection objectives to the stringent

100 X 50 X 25 X 20 X 10 X



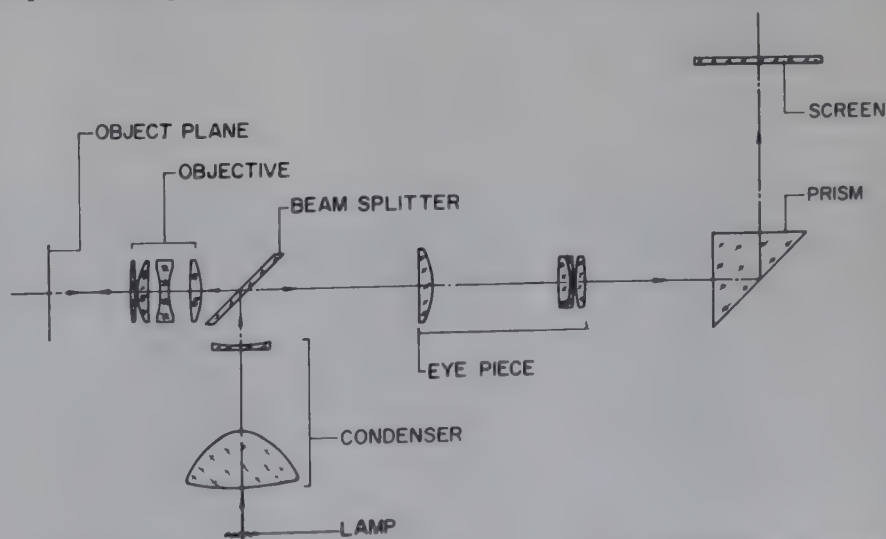
Profile projection objectives designed and developed by Central Scientific Instruments Organisation, Chandigarh: All the five objectives provide excellent image definition and yield a measuring accuracy of $5\ \mu\text{m}$. Their performance is found equivalent to that of imported, Dallmayer lenses.



Optical construction of profile projection objectives

Optical projection attachment to Brinell hardness tester

Under an engineering consultancy agreement with Fuel Instruments and Engineers Pvt. Ltd (FIE), Ichalkaranji (Maharashtra), Central Scientific Instruments Organisation (CSIO), Chandigarh, has completed the design, development and prototype fabrication



Optical projection attachment to Brinell hardness tester: CSIO designed and developed the attachment under a consultancy agreement with a firm. The new optics provides an in-situ well-defined projected image of the indentation mark up to about 100 mm max. diam. The magnification obtained is $14\times$ and accuracy achieved in the object plane is up to $0.01\ \text{mm}$. A salient feature of the development is that hardness testing machines presently being manufactured in India do not provide any in-built indentation diameter measurement system.

of an optical projection attachment which is suitable for incorporation on a Brinell hardness testing machine B 3000(O).

The new optics developed provides an in-situ well-defined projected image of the indentation marks up to about 100 mm maximum diameter. The magnification obtained is $14\times$ and accuracy achieved in the object plane is up to $0.01\ \text{mm}$.

The optical projection attachment has been critically evaluated, in accordance with IS 2281-1968, to the complete satisfaction of the firm.

Hardness testing machines presently being manufactured in the country do not provide any in-built indentation diameter measurement system. As a consequence, the test specimen is normally checked separately in the laboratory, causing much time lag in obtaining the test result and thereby affecting the production efficiency. The CSIO's optical projection attachment, an integral part of the hardness testing machine itself, enables indentation diameter measurement to the required accuracy instantaneously, without the removal of the test block from the stage. It has considerable potential in effecting

specifications could be considered as a big technological breakthrough, especially because of the economical potential of their commercial exploitation. □

improvement in the capability of indigenously manufactured hardness testing machines with consequent increase in their competitiveness, both in national and international markets. □

Marinite substitute

The Central Glass & Ceramic Research Institute (CGCRI), Calcutta, has developed a substitute for the imported Marinite, extensively used in the aluminium industry. A strong, machinable, thermal insulating material, Marinite is based on amosite asbestos fibre and is claimed to be ideal for feeding and conveying molten aluminium and other nonferrous metals without contamination. It helps in speedy handling of molten metal and is widely used in launders, troughs, distribution and pouring boxes, pouring spouts, dip tubes, and in casting ingots, billets, wire-bars, etc.

The product developed by CGCRI is free from asbestos, a hazardous mineral, and is based on materials available in plenty in the country. It is better than the imported material in several respects. Its outstanding properties are: resistance to wetting by molten metals and alloys even on their solidification on cooling; elimination of foundry facing wash; freedom from metal contamination; ready machinability and fabricability; no pre-heating required,

which improves metal quality and yield; better high temperature resistance than that of Marinite; and as it is free from asbestos, no special dust control equipment is required for its handling, machining, cutting, grinding, and drilling.

The cost of finished sets of float and spout is estimated to be substantially lower than the market price of similar, imported items made of Marinite. □

Marine algae of Goa coast

The importance of marine algae as food, feed, chemicals, pharmaceuticals and fertilizers is well known. Yet very little information is available on marine algal resources, ecology, algal productivity and algae as fertilizer, particularly with respect to the Goa coast. Following studies on all these aspects, Shri V.K. Dhargalkar of National Institute of Oceanography, Dona Paula, suggests various steps such as harvesting techniques and period of harvest of economically important marine algae and their rope cultivation at certain sites along the coast.

Providing qualitative and quantitative estimates of marine algal species along the coast, the study deals with the possibilities of cultivating economically important algal species like *Sargassum*, *Gracilaria* and *Hypnea* for extracting alginates, agar agar and carrageenan at

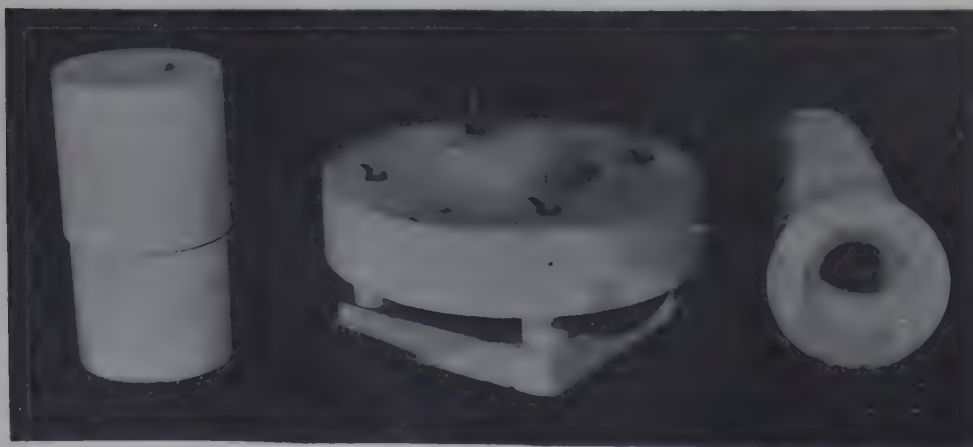
various localities on the basis of ecological studies. The researcher has also worked out productivity estimates of 15 marine algal species and their contribution in the form of carbon to the marine ecosystem. The study has shown that the marine algal species can also be used to prepare a seaweed liquid fertilizer (SLF) to increase the growth and yield of higher crop and fruit-bearing plants. The technical know-how has been worked out and SLF prepared from marine algae has been tested and found quite effective in promoting germination and growth of higher fruit-bearing plants like turnip, pineapple, and chillies. The findings of the study would help in culture of seaweeds and their utilization to augment the natural algal yield.

Shri Dhargalkar, who carried out the study under the guidance of Prof. S.G. Torne of the Department of Botany, S.P. Chowgule College, Margao, was awarded Ph.D. degree by University of Bombay for his thesis based on the study. □

Cytomorphological variation in maize varieties cultivated in Kashmir

A thorough study of morphology as well as cytology of local maize varieties growing in Kashmir was made by Shri P.N. Jotshi of Regional Research Laboratory (Branch), Srinagar. A total collection of 22 varieties was made from grazier (*Gujjars* and *Bakarwals*) fields from the submountainous areas of two major maize-growing districts, namely Anantnag and Baramulla. Out of the collections, 8 were known as *Chiteh Safed*, 6 as *Vozij* and 4 each as *Dabher* and *Lidder*. The researcher tried to find out if these local maize varieties, which appeared to be quite different from modern hybrids or composites, did represent some definite varietal characteristics as have been found in so many races of maize.

The results show that maize types grown in various regions are genetically



Spout and float made out of Marinite substitute developed at CGCRI. Free from asbestos, a hazardous material, the CGCRI product is based on indigenously available materials and is used extensively in aluminium industry; it is better than the imported product

diverse and do not bear any specific morphological or cytological traits which could be taken as varietal characteristics. On this basis, the researcher concludes that when maize must have been introduced into Kashmir it must not have been just one type but several types. Their repeated crossing, human selection, restriction on population size, mutation, adaptation, and various other factors must have given rise to the present-day maize of Kashmir. A fresh look is needed in naming these maize types, according to the researcher.

For his thesis based on the studies, made under the supervision of Dr K.A. Patel of Bhavan's College, Bombay, Shri Jotshi was awarded Ph.D. degree by University of Bombay. □

PROGRESS REPORTS

RRL-Jorhat Annual Report: 1981

The annual report of Regional Research Laboratory (RRL), Jorhat, for the year 1981, just published, shows that 4 processes developed by the laboratory had gone into commercial production for the first time and 6 processes had been released to 14 firms for commercialization. A total of 58 processes had been released for commercialization by the end of 1981: of these, 24 were in production.

The processes for making direct-copy paper, correction paper and thermographic paper are among those which went into commercial production during the year. These products have tremendous export potential.

Successful results were obtained in attempts to produce paper and boards from water hyacinth (*Eichhornia crassipes*). Good-quality papers, boards and grease-proof papers have been produced from this aquatic weed. A fully integrated plant has been established and commissioned at RRL-Hyderabad.

The process know-how package for Chlorfenvinphos, an insecticide, was

prepared and passed on to National Organic Chemical Industries Ltd.

Another major effort of the laboratory is the development of indigenous technology for crude oil additives, which are being imported. The process for the flow improver SWAT-104 used in the transportation of crude oil was carried out in a 30 kg/batch unit and the pilot plant-scale technology for this process was successfully demonstrated to the representatives of Hindustan Insecticides Ltd, New Delhi.

A project, sponsored by North Eastern Council (NEC), Shillong, on the design and fabrication of a coke oven for production of coke from north-eastern coals for use in cement plants was taken up.

With a view to utilizing agro-wastes and water hyacinth, R&D work on cultivation of edible mushrooms was undertaken. Work on mushroom species, viz. winter variety (*Agaricus bisporus*) and summer variety (*Plenrotus sajor caju*) was carried out. Paddy straw compost was found to be the best, followed by citronella spent-up grass. The process on mushroom cultivation was released to growers.

Re-standardization studies on chlo-roquine phosphate, a vital anti-malarial drug, were completed. The project, taken up by this laboratory under a consultancy agreement with Bengal Immunity Company Ltd (BICL), Calcutta, was completed and most of the details of the basic design package for the BICL's proposed 80 tonnes per annum plant was handed over. For the production of water- and fire-resistant corrugated roofing sheets by using rice straw and waste paper, the laboratory set up a plant of 50 sheets per day capacity at Pasighat, Arunachal Pradesh. At the request of National Research Development Corporation of India (NRDC), a demonstration unit of 1 tonne per day for production of corrugated roofing sheets was set up at Central Research Organisation, Rangoon.

Different varieties of adhesive tapes such as paper adhesive tapes, cellophane adhesive tapes, and adhesive plaster have been prepared.

The laboratory entered into agreements with Assam Small Industries Development Corporation and Assam Agro-Industries Development Corporation for providing expertise and technical know-how for setting up agro-based industrial units and commercial cultivation of economic and medicinal plants. Feasibility studies were completed for setting up industrial units in Assam for making cement-like products and bricks from paddy husk ash.

A process for synthesis of Type A and Type X molecular sieves, in which paddy husk is used as the source of silica, was successfully developed by the laboratory. It was released to NRDC for commercialization.

In basic research, mention may be made of the mechanisms of fixing of adventitious organic sulphur in the coal-forming bodies which the laboratory has postulated. Basic work on metabolism of hydrocarbons by microorganisms was continued and conclusive evidence gathered to prove the hypothesis that hydrocarbon transport to microbial cells is through solubilization.

In 1981 four radon stations were installed at Kaziranga (Assam), Tuli, Kohima and Yaongyimsen (Nagaland). One seismic surveillance station was installed at Itanagar (Arunachal Pradesh), which brought the number of such stations in the north-eastern region to five. These stations were established in collaboration with National Geophysical Research Institute, Hyderabad.

During the year the laboratory undertook 17 contract services valued at Rs 12.0 lakh. Farming technology on Java citronella was released to four parties. □

RRL-Hyderabad Annual Report: 1981

Successful commercial utilization leading to the introduction into the market

of Enfenamic acid, the anti-inflammatory/anti-rheumatic drug which it discovered, was one of the landmarks which redound to the credit of Regional Research Laboratory (RRL), Hyderabad. The licensee, Unichem Laboratories Ltd, Bombay, are manufacturing and marketing the drug under the trade name Tromaril. The drug has been well accepted in therapeutic practice by physicians, gynaecologists, orthopaedists and dentists, and its sales had touched the Rs 20 million mark. This information is revealed by the laboratory's annual report for 1981, published recently. The report also reveals that commercial production of glyoxal, based on the laboratory's know-how, had started in two plants, one set up by Rajasthan Glyoxal Ltd, Udaipur, and the other by Manish Organics India Ltd, Ankaleshwar. The other processes developed by RRL-Hyderabad and released to industry relate to: tallow-like hard fat from castor oil, sodium stearoyl-2-lactylate, Diazinon, cashew-nut shell liquid-based surface coatings, trichloroacetaldehyde, specialty papers, and dehydrated castor oil.

Another significant piece of work of the laboratory was process development for the broad-spectrum organophosphorus insecticide, Chlorpyrifos, under the joint sponsorship of IDL Chemicals Ltd, Hyderabad, and Motilal Pesticides Ltd, Mathura. The synthesis of Chlorpyrifos involves three steps: (i) preparation of pentachloropyridine by the vapour-phase chlorination of pyridine at a high temperature in a continuous process, (ii) conversion of pentachloropyridine to 3, 5, 6-trichloropyridine-2-ol, and (iii) condensation of the latter with diethylthiophosphoryl chloride. Effective against house pests and several agricultural pests, the insecticide is in great demand in the country.

Based on the know-how developed earlier, designs were worked out for the pesticides Monocrotophos and Diazinon. The laboratory also carried

out studies on pesticides developed in-house and elsewhere with a view to generating data for the Central Insecticide Board for registration of pesticides.

For the production of active carbons, a rotary kiln (capacity, 1 tonne/day) with an improved steam injection system and discharge mechanisms was successfully commissioned.

A pilot-cum-demonstration plant for producing a variety of papers and boards from water hyacinth was set up following the optimization of process conditions by Regional Research Laboratory, Jorhat, under a collaborative project on 'Management of water hyacinth' launched by the Commonwealth Science Council, London, with financial support from UNEP. Nearly 530 kg (oven-dried basis) of the aquatic weed was processed in 15 batches to produce different varieties of papers and boards.

Gasification of coal is an important method of coal processing; the gas obtained by oxygen-steam reaction with coal can be used as industrial fuel gas, town gas, synthesis gas, and SNG. A pilot plant based on pressure gasification process with a capacity of one tonne per day of coal was under erection at the laboratory. An oxygen plant, a part of the pilot plant (250 Nm³/hr of oxygen), was successfully commissioned and erection of all the major units in the coal gasification section was completed. UNDP is assisting the project.

The laboratory completed bench-scale work on preparing technical-grade pentaerythritol (PE) and sodium formate. Processing of technical grade PE containing predominantly cyclic formals as impurity to get nitration-grade PE was also completed.

The laboratory successfully formulated semiconductor coatings needed by Bharat Heavy Electricals Ltd. These coatings were found satisfactory under severe conditions of test at elevated temperatures and exhibited nonlinear behaviour of current versus high voltage, as required.

The application of modern techniques of computer-aided simulation and optimization to the development and designing of chemical processes is an important project of the laboratory. It has recently installed a fourth-generation digital computer—UNIVAC V77/800. A notable assignment completed relates to the modelling and simulation of ammonia synthesis loop of the plant of Gujarat State Fertilizer Co. Ltd, Vadodara. As a result of this exercise it became possible to suggest modified operating conditions to plant management to enhance production capacity.

The laboratory was chosen for the 1981 FICCI (Federation of Indian Chambers of Commerce and Industry) Award in recognition of its initiative in research in science and technology.

Forty-two papers were published. Two patents were filed and two sealed in the country. □

Environmental Problems in Pulp and Paper Industry: A Bibliographical Review

The National Environmental Engineering Research Institute (NEERI), Nagpur, has brought out a bibliographical review of Indian contributions over the last 30 years on environmental problems in pulp and paper industry.

The publication gives information about 233 documents which include: papers from 28 Indian and 6 foreign periodicals and 47 conferences, and relevant standards, dissertations, reports, etc. The bibliography is divided into two parts; papers from periodicals/conferences are covered in the first part, and the second part deals with standards, theses, reports, etc. The entries in first part are further divided into 5 sections: water pollution, wastewater, solid wastes, air pollution, and environmental pollution in general. Author, subject, geographical and industry indexes are also given.

Copies of the bibliography (compilers: S.K. Kesarwani, Smt. S.N.

Sinnarkar and S.G. Bhat) can be obtained from: The Director, National Environmental Engineering Research Institute, Nehru Marg, Nagpur 440020. □

Indian Literature in Environmental Engineering

The National Environmental Engineering Research Institute (NEERI), Nagpur, has been collecting bibliographical data on Indian contributions in environmental engineering. The information collected is presented through a serial publication entitled 'Indian Literature in Environmental Engineering—A Bibliographical Review'. Sixth in the series, the present volume covers the contributions made in 1977. It contains bibliographical details of 1092 papers culled from 179 Indian and 29 foreign periodicals, and 51 conferences. The entries are arranged under 11 major subject headings. Author, subject and location indexes are also appended.

The publication (compilers S.K. Kesarwani, Smt. S.N. Sinnarkar and S.G. Bhat) can be had from: The Director, National Environmental Engineering Research Institute, Nehru Marg, Nagpur 440020. □

Characterization of Oxygen and Nitrogen Compounds in Heavy Ends of Petroleum

A bibliography on the title topic has been brought out by Indian Institute of Petroleum (IIP), Dehra Dun. The bibliography (compilers: R.N. Agnihotri and Govind Ballabh) contains 246 references covering the period 1960-80, a subject index, and an author index.

Nitrogen compounds in crudes, unlike the sulphur derivatives, are relatively stable to heat and do not decompose in the normal refinery processes. However, even in trace amounts they can create serious refining problems. Similarly, the presence of oxygen affects the quality of the

products. To obviate these problems, extensive studies are being carried out on the characterization of compounds of nitrogen and oxygen. The bibliography is expected to help researchers engaged in these studies.

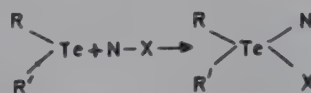
The mimeographed publication (priced) can be had from: The Director, Indian Institute of Petroleum, Dehra Dun 248006. □

EXTRAMURAL RESEARCH

Chemistry of organotelluriums

A CSIR postdoctoral fellow, Dr (Kum) Mala Singh, has studied the chemistry of organotelluriums at Department of Chemistry of Lucknow University, Lucknow.

Diaryltelluriums have been successfully inserted between N-halogen bonds (in bromobenzamide, N-bromophthalimide, N-bromosuccinimide, N-chlorophthalimide and N-chlorobenzotriazole). The reactions provide rare examples of organotellurium amides and incidentally also represent the first example of mixed haloamides containing Te—C bonds. Reactions of Ph(*p*-MeOPH)Te yielded unsymmetrical organotellurium compounds:

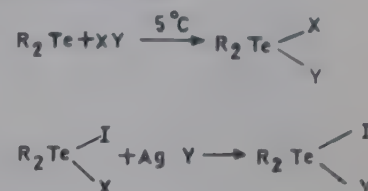


Some new telluracyclopentane derivatives of the formulae $\text{C}_4\text{H}_8\text{TeX}_2$ (X = an electronegative group) have been prepared and characterized.

Complexes containing tetrahalotelluracyclopentane anions of the general formulae $(\text{R}_4\text{M})_2^+ (\text{C}_4\text{H}_8\text{TeX}_2\text{X}')^{2-}$ (R = alkyl group, M = N, P, As or Sb; and X and X' = two different electronegative groups) have been synthesized: (i) by the interaction of 1-telluracyclopentane 1,1-diiodide with the corresponding tetraorganoammonium, -phosphonium, -arsonium or -stibonium halides in non-aqueous solvents; and (ii) via halogen exchange between complex anions and silver or

alkali metal halides. The reactions, essentially quantitative, proceeded smoothly under mild conditions. Various other diaryl tetrahalotellurates of the formulae $(\text{R}_4\text{M})_2 (\text{R}_2^1\text{TeX}_4)$ have also been prepared and characterized.

Iodine monohalides (ICl, IBr), cyanogen halides (CNBr, CNI) and thiocyanogen $(\text{SCN})_2$ add oxidatively to diaryltellurium(II) under mild conditions (5°C). The resulting organotellurium(IV) derivatives react metathetically with silver pseudohalides to yield several new diaryltellurium(IV) pseudohalide derivatives:



Diaryltellurides, R-Te-Te-R, react with thiocyanogen in dry absolute methanol in dark and anhydrous conditions at -10°C to give unstable monoaryltellurium (II) thiocyanates which have been isolated in the form of adducts with neutral N-, O- and S-donor ligands. Interaction with iodine monohalides yielded RTeX and RTeI , indicating cleavage of Te-Te bond in preference to Te(-aryl) bond.

A number of hitherto unknown molecular adducts of 1:1 (metal:ligand) stoichiometry have been synthesized and characterized by the interaction of Ph_2TeX_2 (X = halogen, pseudohalogen, NO_3^- , OCIO_3^-) with several -N-, -P-, -O and -S donor bases.

The studies were made under the direction of Prof. T.N. Srivastava, Emeritus Scientist (CSIR). □

PERSONNEL NEWS

Appointments/Promotions

Shri K.V. Raghavan

Shri K.V. Raghavan has been appointed, on promotion, Scientist F at Regional Research Laboratory (RRL)-Jorhat (3 May 1982).

Shri Raghavan (born in October 1943) obtained his bachelor's degree in

chemical engineering from Osmania University in 1964 and M.S. degree from IIT-Madras in 1975.

Joining RRL-Hyderabad in 1964, Shri Raghavan was associated in the development of processes relating to fatty alcohols, diazepam, chlordiazepoxide, clofibrate, etc. He also provided process design inputs for the 900 tonnes/



annum low temperature carbonization plant set up at Ramakrishnapur.

Visiting Hungary in 1970 under the CSIR-Hungarian Academy of Science exchange programme, he worked on catalysis. In 1980 and 1981 he went to Bangladesh, Sri Lanka, Malaysia and Singapore as a national coordinator of a Commonwealth Science Council project concerning packages for agro-based industries.

Shri Raghavan joined RRL-Jorhat in 1975 as head of its Chemical Engineering Division. As project coordinator, he has contributed to: in-plant studies at Assam Pharma, Jorhat; development of pilot-scale technologies for pesticides; setting up of semi-commercial Chlorfenvinphos plant; and commissioning of 1200 tonnes/annum beneficiation additive plant. His current research interests include chemical reaction engineering, mathematical modelling, and simulation. His group is working on hydrodynamics in spouted beds and mass transfer in loop reactors for gas-liquid reaction systems. He also holds the position as an Adjunct Professor in Chemical Engineering Department at IIT-Kharagpur, and is a recognized external guide for M.S. and Ph.D. programmes. Has 15 papers to his credit.

Honours & Awards

Bhabha fellowship to Dr Harish Bahadur

Dr Harish Bahadur, 32, a Research Associate at National Physical Laboratory (NPL), New Delhi, has been awarded Homi Bhabha fellowship in physics.



With NPL since 1972 as a research fellow of the Department of Atomic Energy, Dr Bahadur has worked on quartz crystals with special reference to their applications in time and frequency standards. He has developed new ways of exciting quartz crystals in their fundamental and overtones and also a method for determining the frequency spectrum of bounded crystal resonators. He has also investigated the effect of magnetic field on their resonance frequencies and of γ -, X- and neutron irradiations on the resonance frequency of quartz crystals. He has established that in a class of crystals with impurities and defects, apart from the usual negative frequency shifts, a positive frequency shift is produced on extended irradiation. Proposing a new concept for explaining the coloration and frequency characteristics of such types of crystals, he has investigated the EPR, infrared and thermoluminescence characteristics of quartz crystals and adduced evidence to support the concept.

Dr Bahadur has examined the surface of vibrating quartz crystals by a scanning electron microscope (SEM) in an effort to analyze the vibrational

characteristics of the crystals, and obtained both the electric potential distribution on the crystal surface and surface topography. He has developed a new method for determining the direction and amplitude of tangential thickness-shear vibrations of rotated Y-cut crystal plates. The SEM work won him an award from the Scanning Electron Microscopy Inc., Chicago, USA, in 1981.

A Ph.D. from Delhi University, Dr Bahadur has published about 85 papers. He did his doctoral and postdoctoral work under the supervision of Dr Ram Parshad, formerly head of NPL's Electronics Division and at present a principal investigator in a CSIR scheme concerning quartz crystals.

With the Bhabha fellowship Dr Bahadur will study radiation hardening of quartz crystals and generation of highly stable frequencies for use not only in space applications but also in time and frequency standardization. □

OBITUARY

Shri S.K. Manchanda

Shri S.K. Manchanda of Publications & Information Directorate (PID), New Delhi, died on 8 July 1982 following a road accident.

Shri Manchanda (born 8 Oct. 1946), an M.Sc. in biochemistry (1968) of Punjab Agricultural University, Ludhiana, joined PID in April 1969 and was assistant editor of Indian Journal of Biochemistry & Biophysics. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Advertisement No. 38/82

The Council proposes to appoint a Scientist F in Central Building Research Institute, Roorkee. The post is in the area of building materials and industrial waste utilization and the pay scale is Rs 2000-125/2-2500 plus allowances. Prescribed forms for sending the curriculum vitae are obtainable from Chief (Administration), Council of Scientific & Industrial Research, New Delhi 110001, from whom further details may also be obtained. Completed proforma should reach CSIR on or before 1 October 1982. □



CSIR NEWS

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Rural Drinking Water Supply

CSC'S WORKSHOP

A regional workshop on Rural Drinking Water Supply organized by National Environmental Engineering Research Institute (NEERI), Nagpur, under the sponsorship of Commonwealth Science Council (CSC) during 10-13 May 1982 at Madras, called for coordinated efforts of the authorities responsible for exploitation of groundwater resources so that the decline in these resources could be stalled.

Thirty delegates from India, Bangladesh, Sri Lanka, Papua New Guinea and Seychelles, who attended the workshop, discussed the choice of technology and optimum utilization of local resources to provide clean water to all by 1990 and recommended that CSC should collect, collate and disseminate information on simple, low-cost technologies on water-lifting and purification devices for the benefit of member countries. Taking note of the infrastructure and the research base existing in India, the workshop felt that the country should continue its R&D efforts in search for operational efficiencies of new technologies with CSC participation.

Among the other recommendations adopted by the workshop: Interested countries and state authorities should establish additional demonstration plants with the aid of funding agencies, preferably with CSC participation. In specific cases, hardware may be obtained from India, which had developed many of these technologies.

Recognizing that the slow sand filter developed jointly by NEERI and WHO-

IRC had proved to be quite effective for community water supply, the workshop recommended that dissemination of the available information on the slow sand filtration technique should be further promoted jointly by IRC and CSC in member countries.

Package water treatment plants for removal of iron, manganese and turbidity developed by Richardson and Cruddes, TWAD Board and NEERI and being field-tested could be profitably used in member countries, the workshop felt. Hence another recommendation that demonstration projects should be undertaken in this area at country level.

The workshop chose the following projects for support by CSC:

1. Study of the effectiveness of various methods and development of techniques for effective participation and to assess their impact on people's knowledge, attitude and practice.

2. Critical evaluation and assessment of design, construction, operation and maintenance of rural water supply schemes including their impact on health, social and economic status of community and suggesting measures for improvement of these schemes.

3. In places where wind energy could be tapped, field-testing of suitable windmills fitted to rural water supply schemes, especially the windmill-operated hyperfiltration plant for desalination, and windmill-operated pumps for exploitation of floating water lenses in sea coasts.

Shri A.K. Aranganathan, Chairman of Tamil Nadu Water Supply &

Drainage Board, inaugurated the workshop. Shri C. Ponnaiyan, Tamil Nadu's Minister for Cooperation and Law, who presided over the inaugural function, emphasized in his address the need for developing a low-cost and efficient system of pumping water from deep borewells to ensure uninterrupted supply of safe drinking water in rural areas.

The NEERI's Director, Dr B.B. Sundaresan, underlined the need for formulating viable projects for India and other developing countries during the International Water Supply and Sanitation Decade 1981-1990.

In his welcome address, Shri K.N. Johry of CSIR's International Scientific Collaboration, mentioned the Council's contributions in developing low-cost technology for rural drinking water supply and expressed the hope that the participating countries could benefit from the Indian experience in the slow sand filtration technique. □

Get-together on Corrosion Inhibitors

The Central Electrochemical Research Institute (CECRI), Karaikudi, organized a get-together on Corrosion Inhibitors at CECRI Madras Unit on 4

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June 1982. Some 100 delegates, who included scientists and representatives from manufacturing and user industries, participated in the meet.

The CECRI's research and development work on corrosion inhibitors as presented at the get-together related to:

1. Vapour phase inhibitors used for prevention of corrosion of ferrous items during storage and transit. The institute has developed two formulations, one based on an aqueous bath and the other on a non-aqueous bath. A prototype coating machine has also been designed and fabricated; it can treat 5000 m² of paper per day. The coated paper compares well with the imported one. The process has been released to three parties.

2. Cooling water inhibitors. These inhibitors are used mainly to reduce the frequency of maintenance and inspection shutdowns and permit more extensive use of iron and low-alloy steels.

3. Acid inhibitors employed in the pickling process for rust and scale removal from ferrous items before giving them finishing treatment. The inhibitors, solid as well as liquid, are cheap and show better performance. These have undergone extensive field trials. The know-how for the solid inhibitor has been released to three public sector undertakings and that for the liquid inhibitor to three private units.

4. Corrosion inhibitors for automobile radiators. Used mainly for automobile radiators made of steel and solder coated steel, the formulation is also useful in conventional type of radiators made of brass and copper.

Besides CECRI, other institutes which presented their work were: National Metallurgical Laboratory (NML), Jamshedpur; Indian Institute of Petroleum (IIP), Dehra Dun; and Defence Research Laboratory (DRL).

The NML delegate reported the development of seven types of acid pickling inhibitors, and a low-chromate inhibitor for use in recirculating water

cooling systems. A non-corrosive flux for soft soldering of copper articles and an anti-tarnishing compound for silverwares were the other NML's developments reported.

From IIP was reported a process for producing calcium and barium petroleum sulfonates to be used as anti-rust inhibitors.

DRL's work reported relates to use of sodium silicate and chromate. These sodium salts have been found to be good inhibitors for cooling systems. The inhibitor developed by using them prevents hard-water scale formation and is free from unpleasant odours and it does not foam.

In his welcome address, the CECRI's Director, Dr K.S. Rajagopalan, highlighted the institute's activities in the field of corrosion prevention. The institute, he said, was concentrating its efforts on the development of *in-situ* corrosion monitoring techniques based on the principle of corrosion processes. Expressing the significance of the corrosion problem, Dr Rajagopalan stated that the annual cost of corrosion of any country worked out to 2-4% of GNP depending on the degree of industrialization. Even the lowest percentage of 2% gave a staggering figure of Rs 13,000 million per year as far as India was concerned, he added.

An important conclusion of the get-together was that the work of the research and development laboratories should be directed to non-aqueous systems and alloys from the point of view of application of corrosion inhibitors. Other observations and conclusions: The CECRI's proposal to work 'desk projects' on new corrosion inhibitors might be pursued. The industry should take more interest in sponsoring investigations on corrosion inhibitor formulations which take into account water chemistry with respect to cooling waters used in their industries. More awareness of the use of inhibitors should be created in the country by organizing special courses. □

UNDP project on mineral exploration concludes

A five-year project on 'Techniques for Exploration of Mineral Resources', sponsored by the United Nations Development Programme and completed at National Geophysical Research Institute (NGRI), Hyderabad, has led to the development of effective techniques for geophysical measurements and interpretations useful in mineral exploration. Sophisticated geophysical instruments have also been produced that now offer possibilities for commercial exploitation. Among these are a microprocessor-based electromagnetic induction prospecting instrument and an electrical well-logging apparatus.

One of the outstanding spinoffs from the project is the development of a fast computer software for application in the exploration of minerals and in computing the response of underground targets of any shape under electromagnetic excitation. Using the integral equation approach and applying the digital linear filters the project scientists have achieved a speed of computation that surpasses that of all other previously known techniques by a large factor.

The main objective of the project was to provide better instrumentation, interpretation and analysis facilities in the search of minerals and groundwater by geophysical surveys and thereby help the mineral-based industries, reduce the nation's foreign exchange expenditure, and augment efforts of self-sufficiency in general.

The results would reduce the cost of geophysical surveys, help in speedy computation of data, and provide better interpretation capability.

Some organizations in Australia and Canada have shown interest in acquiring some of the software developed in this project.

About 20 scientific and technical members and 15 non-technical members from NGRI were associated with this project. Some project scientists were

deputed for training, study or lecture tours to various countries of Europe, North America, Australia, and Japan.

Based on the project work, 24 technical reports embodying the findings of the studies have been brought out. Thirty-one research papers, notes, etc. have been published in journals, and about a dozen papers are in the process of publication. In addition to the development in theory, methods and hardware, a workshop for specialized services with modern facilities for fabrication of prototype geophysical instruments has also been established.

After completion of the formalities by UNDP and NGRI, some of the results would be taken up for exploitation.

About a million US dollars were received as aid from UNDP. This amount was utilized for importing specialized equipment and components, for obtaining services of experts, and for meeting the cost of training and study tour programmes. In addition to UNDP assistance, the Government of India contributed a matching grant for this project.

Dr Hari Narain, Dr A. Roy, Dr S. Balakrishna and Shri D. Gupta Sarma of NGRI and Dr Norman R. Paterson, Expert Consultant (UNDP), coordinated the activities in this project at various stages. □

NGRI better equipped to study seismic activity in N-E Region

In spite of the fact that the North-Eastern Region of India is one of the most seismically active regions of the world, the instrumental data are very scanty and earthquake detection and location capability is very poor. To improve the seismic detectability in this region, National Geophysical Research Institute (NGRI), Hyderabad, has installed five seismic stations, one in Jorhat (Assam), one each at Khonsa and Itanagar (Arunachal Pradesh), and Kohima and Yaongyimsen (Nagaland). These stations have been set up under a

project initiated in collaboration with Regional Research Laboratory, Jorhat.

Before these observatories were established the Central Seismological Observatory of the India Meteorological Department at Shillong was the only good seismic station. NGRI is now recording every month on an average 30 to 40 earthquakes of different magnitudes which would have probably gone undetected.

This network of observatories would help in close monitoring of prevalent seismicity of the region as well as in studying precursory phenomena. □

High-protein biscuits and toffees

High-protein biscuits and toffees can be made with groundnut protein as an ingredient through a process developed by Central Food Technological Research Institute, Mysore. The process involves the addition of specially treated groundnut flour, raising the protein level to 15% in biscuits and 13% in toffees, without affecting the texture or sensory quality. The normal brands of biscuits contain only 6-7% protein, while toffees contain about 2.5%.

Large-scale production trials of high-protein biscuits and toffees under commercial conditions have confirmed the acceptability of these products. Shelf-life studies have shown that the products have good keeping qualities.

High-protein biscuits could be useful in meeting the protein needs of children and convalescents and geriatrics. □

Fungal rennet for making cheese

The Central Food Technological Research Institute (CFTRI), Mysore, has developed know-how for producing fungal rennet, a substitute for calf rennet used in making cheese. The product has been successfully used for making cheddar cheese from cow's milk on a laboratory scale and it has been graded good in organoleptic and physical characteristics.

Although cheese is consumed at present only by a small percentage of population of the country, it can have a wider clientele even among those who are averse to eating cheese made with calf rennet if it is made with non-animal rennet.

Both calf rennet (a preparation of calf stomach) and substitutes are not produced in the country, and the entire requirement of about 200 kg is met through imports. Calf rennet becoming scarce and very expensive, the trend in the foreign countries is also to use rennet substitutes.

The CFTRI product is comparable in enzymatic activity with calf rennet and costs much less. □

NAL's new facilities

An aircraft flight data analysis system and a computer-controlled materials test system have been installed at National Aeronautical Laboratory (NAL), Bangalore. The aircraft flight data analysis system (AFDAS) will be utilized to derive the load spectrum of combat aircraft in service with Indian Air Force on the basis of flight data records. The system is based on a Hewlett-Packard 9825 desk-top calculator, digitizer, and other accessories. Software has been developed to digitize, interpret and sort flight data records to derive a g-spectrum and associated flight statistics, for use in a full-scale fatigue-testing programme. Data covering some 600 flights have already been digitized, and the digitized data are being analyzed.

The computer-controlled (Instron 1343) servo-hydraulic advanced materials test system will be used as a general testing facility to evaluate, in particular, the fracture and fatigue properties of materials and designs developed at NAL. Basic studies on fatigue and fracture mechanisms will also be carried out.

The system consists of a 25-tonne load frame, air-cooled dual (30+6) litre/min. powerpack, electronic controls for static and constant amplitude

fatigue cycling under position, load and strain control, on-line dedicated PDP 11/23 minicomputer system with hardware interface for computer control of the testing machine and accessories to enable conduction of low-cycle fatigue, fracture and crack propagation studies.

The computer configuration enables the conducting of fatigue tests under complex load specimens typical of aircraft structures. The dual powerpack with air-cooling reduces energy consumption.

As part of its major programme of evaluating the fatigue life of a fighter aircraft, the laboratory has started generating data on fatigue crack growth and fatigue life of typical fighter aircraft materials. □

Catalyst poisoning in hydrogenation of nitrobenzene

In the catalytic hydrogenation of nitrobenzene to aniline, a major problem encountered is the deactivation of copper chromite catalyst by thiophene present in the nitrobenzene feed. Shri S.D. Sansare of the Chemical Engineering Division of National Chemical Laboratory (NCL), Pune, has studied the kinetics of the deactivation reaction. Of the two well-known approaches, 'power law' and 'heterogeneous Hougen-Watson model' employed for determining the most probable mechanism of the reaction, the latter was found to be more suitable. The step involving adsorption of nitrobenzene on the catalyst appeared to be the rate controlling step. A dual site mechanism of adsorption has been proposed.

Studies on the catalyst poisoned with thiophene present in the feed revealed that while the fall in the conversion owing to poisoning is rapid initially, it slows down with time to a constant non-zero value. Shri Sansare proposes that in the beginning the adsorption of thiophene on the catalyst increases with time. A stage is, however, reached when the thiophene in the gas

phase comes into equilibrium with the adsorbed thiophene species, leading to the end of the irreversible adsorption and the start of reversible adsorption, which is reflected by the constant non-zero conversion.

In the deactivation mechanism proposed, the activity has an exponential dependence on time, and the adsorption of thiophene occurs in two stages, the first corresponding to the irreversible adsorption and the second to the reversible adsorption.

In a separate study, the adsorption of thiophene on the catalyst under reaction conditions was investigated using the gas-chromatographic technique. Both the irreversible and reversible adsorption phenomena were found to exhibit an unusual behaviour. The rate of irreversible adsorption was found to depend on the quantity of chemisorbed thiophene. The extent of reversible adsorption on the catalyst surface with partially saturated irreversible adsorption sites was also found to depend on the initial surface coverage. Modification of the existing sites and/or creation of new active sites on the surface, as a result of the thiophene adsorption, could be the most probable explanation for these unusual observations.

The adsorption isotherms follow the Freundlich equation and the value of the isosteric heat of adsorption determined from the isotherms also suggests that the surface coverage has a significant influence on the pattern of adsorption.

Shri Sansare, who carried out this work under the guidance of Dr L.K. Doraiswamy of NCL, was awarded Ph.D. degree by University of Poona for his thesis. □

Small-scale production of bakery flour

The Central Food Technological Research Institute, Mysore, has evolved a simple wheat milling process with which it will be possible for the small-

scale industry, with low capital investment, to produce a bakery product similar to the one obtained from roller mills. For fabricating a 100 kg/hr milling unit, low-cost machines such as a hand mixer, a huller, a *chakki* and a sifter have been employed. The process consists in cleaning wheat manually or mechanically, conditioning it with the addition of water in a hand-operated mixer, removing bran by polishing in a huller, grinding the polished wheat in a *chakki* under standardized conditions, and sieving the milled product in a mechanical sifter. The end products are bakery flour and refined *atta*. The quality of *atta* is better than that of the one obtained from roller mill. The bakery flour is suitable for preparing bread, biscuits, cakes, and wafers.

By adopting the process, about 95% of the wheat, with almost all the nutrients present in it, can be utilized for human consumption. □

Viscosity and light scattering study of hydrolyzed polyacrylamides in solution

The synthetic polyelectrolytes carry ionizable groups along their backbone. They exist in greatly expanded configurations in solution as compared to equivalent non-ionic macromolecules. Shri R.A. Kulkarni of the Polymer Chemistry Division of National Chemical Laboratory (NCL), Pune, has synthesized polyacrylamides of differing molecular weights and hydrolyzed them to different extents. These partially hydrolyzed polyacrylamides were used as model polyelectrolytes to probe expansion coefficients by viscosity and light-scattering techniques.

The expansion coefficients obtained were used to check the predictions of various macroion expansion theories. The electrostatic expansion coefficients solely attributable to the electrostatic charges, calculated using the parent polyacrylamide as the reference non-electrolytic macromolecule, could not be explained through any of the existing

theories. However, attributing the total expansions to the presence of electrostatic charges alone, data could be represented by the Fixman's theory but a better fit was obtained by applying Chien-Ishihara theory. The expansion coefficients obtained by light scattering were 30-300% higher than the values obtained by viscosity method. This showed that the polyelectrolytes have a copolymer character and hence a microinhomogeneity, and the classical light-scattering technique valid for a two-component system is not valid for the determination of dimensions of these polyelectrolytes.

For his thesis based on these studies, Shri Kulkarni was awarded Ph.D. degree by University of Poona. He carried out the work under the guidance of Dr S. Gundiah. □

PROGRESS REPORTS

ITRC Annual Report 1980-81

The report of Industrial Toxicology Research Centre (ITRC), Lucknow, for the period 1980-81, which has just been published, shows that the laboratory enlarged the sphere of its activities by initiating studies in environmental carcinogenesis.

Experimental studies were continued on the toxicological effects of dyes and dye intermediates. A survey of yellow to orange coloured eatables collected from rural areas of Uttar Pradesh showed that nonpermitted colours were being used at an alarming rate (80%). The pattern of adulteration in rural areas was almost the reverse of that observed in an earlier survey in the urban areas. Studies carried out on the kinetics of uptake of benzanthrone by skin show that in the presence of very high dilutions of serum, there was lesser efflux of benzanthrone and most of it took place within 120 min. of incubation.

Biological effects of toxic metals and their interaction on man and his ecological partners were studied. Studies were made on functional

changes in the brain induced by toxic metals. Manganese significantly inhibited the lipid peroxidation potential of brain in treated male rat without altering the contents of iron and ascorbic acid, suggesting that CNS (central nervous system) toxicity of manganese may not be associated with accelerated *in vivo* lipid peroxidation. Various other toxic effects of exposure to manganese for short and long durations were recorded in biological and physiological systems of monkeys and rats.

Accumulation of metal ions in the body is known to induce the formation of metalloproteins, which may act as protective agents. Investigations on the effects of cadmium on the distribution of iron (^{59}Fe) in partially hepatectomized rats revealed that the disappearance of ^{59}Fe from blood was significantly affected at a relatively high concentration of cadmium (1.5 mg/kg). Cadmium also affected the metabolism of some other micronutrients.

Chelating agents are known to remove toxic metals from the body. Studies were hence carried out on the interaction of chelating agents with the toxic metals, oriented specifically towards their removal without causing trace metal imbalance. Also, search for newer chelating agents, which have the potential for removing toxic metals from the body, was made. The potential of two important thiol chelating drugs, D-penicillamine and DMS (2,3-dimercaptosuccinic acid), on the excretion of lead in lead-poisoned rabbits was investigated; the urinary excretion of lead increased more significantly during treatment with DMS than with D-penicillamine.

Long-range investigations on biochemical ecotoxicology of selected environmental pollutants are needed so that an ideal situation wherein industrial and agricultural progress and healthy environment are compatible may be evolved. Mathematical formulae for determining predictive indices for biomagnification, ecotoxicology,

relative biotransformation and comparative toxicity were developed. Novel model systems were evolved in order to study the effect of air and water pollutants. The work was partly supported by the Department of Environment.

Experimental studies were made on animals to evaluate the carcinogenic and cancer-promoting activity of the two varieties of jute batching oil used in India.

Pesticide residue levels in human body tissue, food materials, meat and meat products, fruits, vegetables, milk and milk products were determined and their environmental impact was monitored. Significant correlations of total DDT and BHC levels were observed among maternal blood, neonatal blood and breast milk. Pharmacological and toxicological studies were also made on other pesticides to determine the health hazards induced by them. Effects of barbiturates and changes in the level of GABA—the main inhibitory transmitter of the central nervous system—on *p,p'*-DDT induced convulsions and neurochemical changes in the corpus striatum of mice were also determined.

Toxicological effects of petroleum products and plastics and chemical additives used in plastic industry were also studied. Petroleum and its derivatives have been reported to induce liver injury, disturbance in haematopoietic system, and central nervous system. Health hazards like angiosarcoma of the liver due to vinyl chloride and dermatitis, asthmatic reaction, reproductive disorders and mutagenic and teratogenic episodes due to various additives are met with in workers employed in plastic industry.

Epidemiological studies were conducted on the health hazards of 58 workers exposed to cyanide fumes and 88 workers to tear smoke in public sector units and 686 workers employed in a textile mill at Lucknow. Workers were found to suffer from eye troubles, suggestive of conjunctivitis, chest pain and disease of the teeth and gums.

Abnormal values of alkaline phosphatase were recorded in 20% of workers. It was found that prevalence of byssinosis in textile workers increased with a corresponding increase in atmospheric dust concentration. Other respiratory diseases such as pulmonary tuberculosis and acute and chronic bronchitis were also observed.

An exploratory survey for assessing dust problems in slate pencil industry was conducted at the request of the Department of Industries, Bhopal, and safety and preventive measures were made available to the agency.

Under an all-India coordinated project, biological evaluation of pesticides was done. Test systems were evolved to monitor ill effects on brain and other tissues and eventual mutagenic effects by following observations in bone marrow chromosomes and malformations in the embryo. In another all-India coordinated project, Indian flora were screened for pollution resistance. Some species of plants were found to have more resistance to air pollutants and had no ill effects.

Some of the emerging areas of biological research under study relate to the development of a test system in biomembranes for toxicological evaluation; use of cell culture technique in the evaluation of the toxicity of mineral dust; and sophisticated techniques for evaluation of immunotoxic potential of coal-mine dust and chemicals.

In a research programme on experimental infective pneumoconiosis, started in 1970, considerable amount of new information has been collected and several lines of further research have been suggested, leading to the essential solution of the problem of fugitive dust toxicity.

Twenty-nine research papers and five review articles were published. □

MATrix FORtran Language for Matrix Operations

A report briefly describing the salient features of MATFOR—MATrix FORtran Language for Matrix Opera-

tions—being developed by Structural Engineering Research Centre (SERC), Roorkee, has been prepared by Sarita Jain of SERC.

MATFOR is an effort to provide a basic set of mnemonics meant not only for the specialist in the art of efficient matrix operations but to a very wide class of users interested in data-handling via matrices. The proposed language will provide mnemonics to operate upon single precision, double precision, complex and Boolean matrices. Most of the functions required in day-to-day use by engineers, physicists, economists, statisticians, bioscientists and other specialists are being covered in the proposed language. MATFOR can be implemented on any computer which supports FORTRAN IV or compatible versions.

Copy of the report (18 pages) is available from: The Director, Structural Engineering Research Centre, Roorkee 247672. □

'COMPLEX' User's Manual

This is a program package for the static analysis of uniaxial structures developed at Structural Engineering Research Centre (SERC), Roorkee. In preparing this manual, the result of a study of the available program packages, the authors (S.P. Sharma, B.K. Goyal, R.K. Vaish, Ram Kumar, Jamshed Ahmad and Sarita Jain) have drawn heavily on the available input and output strategies. All the program packages available for the analysis of complex structures need an enormous amount of input in spite of the fact that the preprocessor and internal data generation facilities are provided. The objective was therefore to work out a finite element program package which required a minimum of input data. Thus was developed a program package complex primarily for structures which could be defined by a single axis and a number of sections. The manual provides information which is expected to be sufficient for a user of this program package. It has five chapters: Structure

discretization, Element features, Output specifications, Input specifications, and Examples. Two appendixes—Pre-processor, and Anisotropic Material Law—are also provided.

The program package is available at SERC-Roorkee for use. It has been implemented on IBM 370/145, UNIVAC 1108, and DEC 2050 systems. The package may also be implemented on other systems should a user so desire on mutually agreed terms.

Copy of the manual (112 pages) is available from: The Director, Structural Engineering Research Centre, Roorkee 247672. □

CONFERENCE BRIEFS

Task Force Meeting of WHO/IRPA

Dr V.N. Bindal, head of the Ultrasonics Section of National Physical Laboratory (NPL), New Delhi, attended, on invitation from WHO, the task force meeting on 'Environmental Health Criteria Document on Ultrasound' held in Geneva from 7 to 11 June 1982. Organized by the World Health Organisation and International Radiation Protection Association (IRPA), the meeting was attended by representatives from Canada, France, Germany, India, Italy, Japan, Sweden, UK and USA, besides observers from USA and Switzerland, reports Dr Bindal. The document, which reviews data on the effects of ultrasound on biological systems, would be useful in evaluating health risks for man. The main topics covered in the document are physical characteristics of ultrasound, mechanisms of interaction, measurement of ultrasound fields, sources and application of ultrasound, effects of ultrasound on biological systems, effects of airborne ultrasound on biological systems, health risk evaluation, protective measures, and summary and recommendations.

The document is expected to be published under the joint sponsorship of UNEP, WHO and IRPA. □

DEPUTATION BRIEFS

Shri P.S. Nagpaul of National Institute of Science, Technology and Development Studies (NISTADS), New Delhi, attended a workshop on 'Management of research and development in socio-cultural settings of countries with limited resources' held at Buenos Aires, 15-23 March 1982. The workshop was organized within the framework of International Comparative Study on Organization and Performance of Research Units (ICSOPRU) in which, besides India (NISTADS), five other countries, viz. Argentina, Egypt, Republic of Korea, Poland and USSR are participating, reports Shri Nagpaul. The CSIR scientist also presented a paper, one of the five presented, on 'Supervisors of research units, their profile and role'.

Dr R.A. Mashelkar of the Chemical Engineering Division of National Chemical laboratory, Pune, was deputed as Visiting Professor to Institute for Kemiteknik, Danmarks Tekniske Højskole, Denmark.

During his stay, Dr Mashelkar gave a series of advanced seminars on 'Heat and mass transport phenomena in macromolecular media'. He was also invited to present special seminars on the problems of chemical industry development in India by Danish Institute of Engineers at Lyngby, and University of London, London. He also delivered lectures at Danish Technical University, Lyngby; Imperial College of Science and Technology and University College, London; University of Salford, UK; University of Dortmund, and University of Erlangen, FRG.

Dr Mashelkar was also invited to advise on the setting up of a new polymer research centre at University of Copenhagen.

Dr C. SivaRaman and Dr N.G. Karanth, also of NCL, Pune, visited several research laboratories and a few fermentor manufacturing companies in Japan, USA, Canada and Europe for a

period of seven weeks starting from 22 April 1982 on a sponsored study tour in connection with a UNDP project on Bioscience and Engineering. During their visit the NCL scientists witnessed the latest developments in applications of biotechnology, particularly relating to bioconversion of cellulose to food, energy and chemicals. They identified institutions with whom NCL could seek cooperation for the UNDP project at the Pune laboratory.

As a member of technical delegation of Ministry of Petroleum, Dr V.M. Nadkarni of NCL visited Europe, USA, Canada and Japan during April 1982 with a view to selecting a suitable technology for the polymer plants of Maharashtra Gas Cracker Complex.

Dr S.K. Tandon of Industrial Toxicology Research Centre, Lucknow, attended the eighth annual meeting of the International Union of Pure and Applied Chemistry's sub-committee on environmental and occupational toxicology of nickel held at Dublin, Ireland, from 9 to 11 June 1982. Dr Tandon presented a research paper titled 'Effect of nickel pretreatment on cadmium toxicity and vice versa'. Thirty scientists from different countries discussed various aspects of nickel toxicology and formulated recommendations for future research and development in the area, reports the ITRC scientist.

Dr Tandon also spent a week, 14-21 June, at Medical Research Council Laboratories, Carshalton, Surrey, and MRC Clinical Research Centre, Harrow, Middlesex, on invitation. He studied the newer analytical techniques and discussed with scientists of those institutions recent developments in the field of toxicology of mercury, cadmium, and nickel. □

PERSONNEL NEWS

Prof. Dinesh Mohan retires

Prof. Dinesh Mohan, who was associated with Central Building Research

Institute, Roorkee, since its nucleus was established in 1947 and who headed the laboratory as Director since 18 April 1964, retired voluntarily on 30 June 1982.

A soil engineer by training and profession, Prof. Dinesh Mohan's name is inseparable from the under-reamed pile foundation technique. This technique, which he has developed, provides highly economical and trouble-free foundations in soils containing expansive clays. Prof. Dinesh Mohan is



equally well known for his extensive investigations which have led to low-cost school buildings as well as urban and rural dwellings. These techniques have been not only field-tested on a massive scale, they have also been adopted extensively in many states in the country. An engineering scientist, Prof. Dinesh Mohan laid particular emphasis on acquainting architects, construction engineers and others concerned with building industry with the results from his laboratory with a view to implementing research findings. A fellow of Institution of Engineers (India), he established firm links between the India's premier engineering professional institution and CBRI. CBRI's current standing as a leading building research laboratory is largely due to Prof. Dinesh Mohan's dedicated efforts.

Prof. Dinesh Mohan has since taken up a United Nations assignment as building research expert at Jamaica.

For a fuller account of Prof. Dinesh Mohan's scientific career and attainments, see CN 14(9) (1964), 1; 24 (1974), 34. □

Shri R.C. Mangal: CBRI's Acting Director

Shri R.C. Mangal of Central Building Research Institute (CBRI), Roorkee, has been appointed Acting Director consequent on the retirement of Prof. Dinesh Mohan (30 June 1982).



Shri Mangal was heading CBRI's Development, Construction and Extension Division. He is on the permanent advisory committee of U.P. Government's PWD Research Institute, Lucknow. He has served as Assistant Transport Commissioner (Buildings) U.P., and as Executive Engineer, Delhi Development Authority. It was under his guidance that the Inter-State Bus Terminus at Delhi was constructed. Joining U.P. Housing Board as Superintending Engineer in 1974, he took over as Director of Works. In 1977 he joined CBRI as Scientist F in charge of its six extension centres.

Shri Mangal is a fellow of Institution of Engineers (India). □

Shri S. Prasad

Shri S. Prasad, Principal Information Officer, University Grants Commission (UGC), has been appointed Consultant



(in the rank of Scientist F) in the Public Relations Unit at CSIR Headquarters (15 July 1982).

After completing graduate and postgraduate studies at Allahabad University, Shri Prasad was sub-editor of *The Leader* published from Allahabad. Joining All India Radio as Assistant News Editor in 1951, he was absorbed in the Central Information Service in 1952. He worked as News Editor and Senior Correspondent in AIR till 1973 and later served as Deputy Principal Information Officer, Government of India. He took up the UGC assignment in 1980.

Shri Prasad has covered several national and international conferences and contributed to newspapers a number of articles on education. □

Shri K.L. Wadhawan

Shri K.L. Wadhawan, Administrative Officer, National Physical Laboratory, New Delhi, has assumed charge as Chief (Administration), CSIR Headquarters, New Delhi (13 July 1982) in place of Shri G. Chatterjee who was relieved consequent on his appointment as Financial Adviser and Joint Secretary in Department of Science and Technology, New Delhi.

Dr B.L. Amla

On completion of his foreign assignment with the World Bank, Dr B.L. Amla resumed charge as Director, Central Food Technological Research Institute, Mysore (6 July 1982). □

Honours & Awards

Dr L.K. Doraiswamy

Dr L.K. Doraiswamy, Director, National Chemical Laboratory, Pune, has been awarded the honorary degree of Doctor of Science by University of Salford, UK, for his outstanding contributions in the field of chemical engineering. The degree was conferred on him at a convocation held at Salford on 9 July 1982. □

ANNOUNCEMENTS

Seminar on Polymers for Surface Coatings

A seminar on 'Polymers for Surface Coatings: Recent Developments' will be

held at Regional Research Laboratory (RRL), Hyderabad, under the auspices of Oil Technologists' Association of India (OTAI), Southern Zone, on 27-28 November 1982. The topics to be discussed are: (i) Polymers and their role in coatings vis-a-vis improved protection against corrosion; (ii) Polymers and their status in application to new areas of development like offshore exploitation, atomic power reactors and space exploration; and (iii) Newer types of polymers to meet ecological and economy requirements, e.g. water-soluble vehicles and powder coatings, ultraviolet and electron-beam curing systems.

Abstracts of research papers to be presented in the seminar are invited. The last date for submitting abstracts and for registration is 31 August 1982. Further details may be obtained from: Dr P.S. Sampathkumaran, seminar convener, OTAI Southern Zone, Regional Research Laboratory, Hyderabad 500 009. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

The Council proposes to appoint Scientists F in its various constituent laboratories. The respective discipline/area and the CSIR constituent laboratory as also the deadline for sending *curriculum vitae* are as follows:

Advt. No. 39/82: R&D planning, and technology transfer in the context of coal resources of North-East Region, Regional Research Laboratory, Jorhat—16 September 1982.

Advt. No. 40/82 (Engineer in Scientist F scale): To plan, equip and take care of the workshop and its associated facilities and in general to take care of all the services of the laboratory, Centre for Cellular and Molecular Biology, Hyderabad—15 September 1982.

Advt. No. 41/82: Oilseed proteins and other vegetable proteinaceous materials, Central Food Technological Research Institute, Mysore—30 September 1982.

The pay scale for these posts in Rs 2000-125/2-2500 plus allowances at the Central Government rates. Prescribed forms for sending the *curriculum vitae* are obtainable from the Chief (Administration), Council of Scientific & Industrial Research, New Delhi 110001, from whom further details regarding the above posts may also be obtained. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

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Prime Minister calls for greater interaction between laboratory and industry

Praising the Indian scientists in general and CSIR scientists in particular for the excellent work they have been doing, the Prime Minister Smt. Indira Gandhi exhorted them to take up the responsibility of bringing about greater interaction between laboratories and industries. In her capacity as CSIR President the Prime Minister was addressing the 32nd Conference of CSIR Directors held on 3 July at CSIR Science Centre, New Delhi. Smt. Gandhi had a word of praise for Indian scientists working abroad. As long as they added to human knowledge it did not matter whether they worked in India or elsewhere, she added.

The Prime Minister informed the conferees that a Technology Policy

Statement was being drafted by the Science Advisory Committee to the Cabinet.

Calling upon the scientists to make all efforts to take the nation forward and work for the welfare of the people, by recognizing their aspirations, she said: "People are not mere statistics. Whenever good achievement was noted the credit went to the lead organization." The credit should go rather, she emphasized, to all those who were concerned with the achievement; and recognition and benefit must be shared by all members. She further said that all that was happening in the West need not necessarily be termed as progress. "If a city despite its affluence could not provide fresh air and pure water to its

citizens, it was a sign of backwardness."

Ever eager to achieve results, the Prime Minister made no secret of the bureaucratic hurdles that face scientific institutions in India. In this context, Smt. Gandhi made a pointed pitch for evolving a simplified administrative system with rules and regulations suited to scientific organizations.

The CSIR Vice President Prof. S. Nurul Hasan, in his welcome speech, referred to the living and working conditions of CSIR employees. He announced the introduction of a new scheme by which a compensation of up to one lakh of rupees would be paid to the bereaved family of an employee who died or was incapacitated while in service whether on duty or otherwise. An extensive housing programme had been drawn up and necessary changes in the bylaws made with a view to raising loans from the Housing & Urban Development Corporation Ltd, said the Vice President. These measures, he hoped, would help attract scientists working abroad.

Though CSIR might not be able to show frequently spectacular achievements like the expedition to Antarctica which it organized on behalf of the Department of Ocean Development, the Council's contributions, when individual achievements were added, were



The Prime Minister, and President of CSIR, Smt. Indira Gandhi addressing the 32nd Directors' Conference at the CSIR Science Centre, New Delhi. To her right is the DGSIR Dr G.S. Sidhu and to left, Prof. S. Nurul Hasan, Vice President of CSIR.

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considerable in the realm of import substitution, said the Vice President. The Council was making efforts to establish closer linkages with the user departments/ministries, added Prof. Hasan.

Continuing, the Vice President pointed out that when the Sixth Plan (1980-85) was being drawn up it was visualized that a fairly large part of the investments in R&D in different ministries would be made available to CSIR for specific programmes. This expectation had not materialized even at the mid-point of the plan. "The scientists in CSIR were fully aware of, and enthused by, the new orientation that had been given under the dynamic leadership of the Prime Minister to bring about a linkage between science and development and were working towards the realization of this concept", Prof. Hasan concluded.

Dr G.S. Sidhu, Director General, CSIR, in his statement expressed concern over the import policy which continued to be quite liberal. "Import of know-how is taking place even when indigenous capability would have been used. Many a time we have received not only second-hand know-how but also reconditioned equipment. Yet this policy continues", Dr Sidhu stated.

The Director General stressed the need for the setting up of a mechanism which should: (1) decide where technology has to be imported and where it can and should be developed indigenously; (2) set time-bound targets, ensure adequate support and commitment to utilize technology identified to be developed indigenously; (3) ensure the association of appropriate research and development institutions with the import of know-how so that it can be absorbed, adapted and improved; and (4) recommend incentives for use of technology developed indigenously and disincentives for importing technology.

Highlighting the major R&D activities of CSIR, the Director General said that the Council was contemplating major thrusts in the areas of

microelectronics, in particular large-scale integrated circuits and very large-scale integrated circuits. In the area of biotechnology an institute of microbial technology was being planned. Work was already on for developing the technology for production of fibre optics for communication. Cryogenics, superconductivity, coal and catalysis were the other areas of thrust. After the successful organization of the Antarctica expedition by CSIR on behalf of the Department of Ocean Development, the Department had entrusted to the Council the responsibility of exploration for polymetallic nodules with a view to demarcating mining sites.

The Council was also in a position to carry out analytical studies with a view to weighing different options concerning S&T planning, said Dr Sidhu. In this context the Director General underscored the importance of a strong, modernized and sophisticated information base — an area in which CSIR had considerable capabilities and at the same time was aiming at further development. Dr Sidhu also mentioned that a computer-based study by one of the CSIR constituents had helped the Gujarat State Fertilizer Corporation in plant operation. Similarly, CSIR's work in the area of sugar industry could yield rich dividends, added the Director General.

If some major areas were to be selected in which already imported technology or technology to be imported was to be updated, the Director General desired that a proper directive be issued that this major task be entrusted to CSIR in as many spheres as possible. Where such technologies are owned by the public sector companies, it should be possible to establish joint research, development and design teams with public sector companies.

At the conference, the chairmen of the five coordination councils of CSIR presented the progress achieved in their respective groups.

Dr Raja Ramanna, Director, Bhabha Atomic Research Centre, Bombay, and Secretary to the Government of India, and Dr V.S. Arunachalam, Director General, Defence Research & Development Organisation, who both attended the conference, underlined the need for different agencies to work in close cooperation to achieve national goals. □

Ten CSIR scientists among NRDC's Independence Day Awardwinners

Three teams of CSIR scientists working in four CSIR constituent laboratories figure among the 13 groups of invention awardwinners announced by the National Research Development Corporation of India on the eve of 1982's Independence Day.

The CSIR teams of awardwinning scientists are: (1) Dr S. Singh, Shri R.C. Nandi, Dr J.P.S. Sarin and Dr N.M. Khanna of Central Drug Research Institute, Lucknow, who win jointly a sum of Rs 10,000 for developing a new cervical dilator (Isaptent I and its improved version II); (2) Dr K.G. Das of Regional Research Laboratory, Hyderabad, and Shri N. Sadasivan, Shri H.S. Jagtap, Shri M.Y. Gupte and Shri S.P. Mirajkar of National Chemical Laboratory, Pune, who get a certificate of merit for developing a 'controlled release herbicide'; and (3) Shri S.S. Jain of Structural Engineering Research Centre, Roorkee, who has been granted a sum of Rs 1500 for the development of 'Sultan' motor.

Besides, Prof. P.V. Indiresan, Director, Indian Institute of Technology (IIT), Madras, who also holds the position, concurrently, as Honorary Adviser to CSIR, has been chosen, jointly with five other researchers of IIT, New Delhi, for an NRDC award. The award (Rs 25,000) is for developing a re-engineered control system for the deck landing mirror sight.

Details of the awardwinning inventions will be published in forthcoming issues of *CN*. □

CSIO develops haemodialysis machine

The Central Scientific Instruments Organisation (CSIO), Chandigarh, has developed a haemodialysis machine, which provides a continuous supply of a solution of controlled concentration at the right temperature and pressure to the dialyser.

About 300 litres of dialysate is required for dialysis of one patient and therefore to avoid the storage problem, a 35-times concentrate is kept in a container and then mixed with tap water. Before mixing, the water is filtered and water flow is directed to the proportionating pump, which is designed to provide a constant ratio of the concentrate to water in its output. Dilution is generally maintained to within $\pm 1\%$. The nominal output from the pump is 550 ml/min.; there is always an overflow from the tank down the overflow drain. The water and concentrate, which from now onwards is called the dialysate, enters the header tank. This tank, made of Perspex, has an

arrangement for heating the dialysate and monitoring its temperature. So that entrapped air bubbles are removed from the heated dialysate, it is passed through a polypropylene mesh. From the header tank the dialysate passes through a flowmeter. The flow rate is adjusted by means of a flow needle valve. After the flowmeter, the dialysate passes through a 3-way solenoid valve. This valve provides two possible paths for the dialysate, bypass and through the dialyser. The 'bypass' path is provided as a safety factor so that only if all conditions are normal will the dialysate be allowed to flow to the dialyser.

The flow of the dialysate to the dialyser takes place under the influence of the effluent pump. The liquid returned from the dialyser is known as 'effluent'. The pressure of the effluent on the return line is measured by a strain gauge pressure transducer. It is further passed through a 'blood leak detector cell' where monitoring for the presence of blood in the effluent, which might occur through any holes in the dialyser membrane, is carried out. The effluent

pump exhausts the effluent to the external drain.

The patient's venous blood pressure is measured by means of a strain gauge pressure transducer which is connected on the blood side of the dialyser.

Specifications

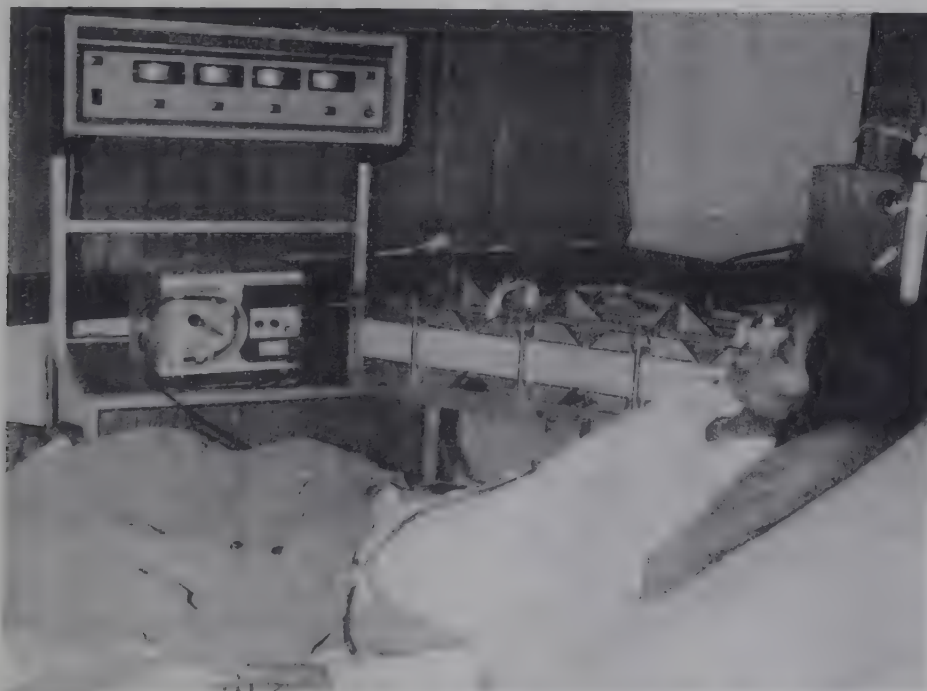
Temp. scale	: 33°-43°C
Temp. control	: $\pm 0.25^\circ\text{C}$
Conductivity scale	: 11 to 16 mmho
Dialysate pressure	: 0-300 mmHg
Venous pressure	: - 150 - 0 - + 150 mmHg
Blood leak sensitivity	: 0.5 ml/litre of dialysate
Dialysate flow	: 50 to 700 ml/min

The machine, developed for the first time in the country, was under clinical trials at the Post-Graduate Institute of Medical Education and Research, Chandigarh, for about two years, with their dialyser. After it was tested under simulated conditions, the machine was tried on human patients successfully. By simplifying some of the operations, it will be possible to make the machine suitable for home dialysis applications. □

Ethylenediamine and polyamines commercially produced

Based on the know-how developed by National Chemical Laboratory (NCL), Pune, ethylenediamine and polyamines are being commercially produced by Diamines and Chemicals Ltd (DACL), Kalol, at their plant at Vadodara. Developmental work on these chemicals was carried out jointly by NCL and DACL. The plant has a capacity to manufacture 1200 tonnes per annum of amines valued at Rs 60 million. These chemicals are being manufactured for the first time in the country.

Ethylenediamine is a bulk organic chemical which finds use in the manufacture of vulcanized rubber, photographic chemicals, textile finishing agents, insecticides, and as an intermediate in the manufacture of resins. □



The haemodialysis machine developed by CSIO, Chandigarh, being used at Post-Graduate Institute of Medical Education and Research, Chandigarh. It requires about 300 litres of dialysate for one patient. Developed for the first time in the country, the machine has undergone successful trials, and would be modified for home dialysis application

Rock bed energy storage for winter heating and summer cooling

An integrated system for winter heating and summer cooling of rooms by using rock bed for energy storage has been designed by Central Building Research Institute (CBRI), Roorkee. The heating system, consisting of solar air heaters, rock bed energy storage, and a blower for circulation of air, has been studied for heating a room in winter. A double-walled masonry container fitted with steel grills for supporting pebbles is suitably filled with pebbles of appropriate size to store solar energy for winter heating and the coolness of air at night for summer cooling. Nine solar collectors each of 1 m² area fabricated from corrugated and plane galvanized-iron sheets have been provided for heating a room of size 3.5 × 3.0 × 3.0 m.

The performance of the system in winter was found to be satisfactory with the room temperature ranging between 18 and 21°C. This system has been commissioned for room cooling during the current summer, for which solar collectors have been disconnected and the coolness of night air is stored in the pebbles for cooling during daytime. In these preliminary experiments, the room temperatures ranged between 27 and 30°C—temperatures within summer comfort range. □

Raney nickel catalyst

The kinetics of leaching of Raney Ni-Al alloy with alkali in the preparation of Raney nickel catalyst have been studied at different alkali concentrations and temperatures and also using the alloy particles of different sizes. The researcher is Shri S.K. Chaudhari, a University Grants Commission research fellow, who made the study in National Chemical Laboratory (NCL), Pune. The effects of preparation and ageing (or storage) conditions of Raney Ni on its H-content and catalytic activity for hydrogenation of *p*-nitrotoluene were

also studied. A close correlation between the catalytic activity and H-content of the catalyst was observed.

Poisoning effect of thiophene, dichloroethane, and heavy metal compounds of different concentrations on the activity of the Raney Ni was investigated in a three-phase slurry reactor, and expressions relating poison concentration with the catalyst activity were derived.

The effects of reaction medium and reaction products on the hydrogenation were studied. Water was found to promote the reaction to a large extent. Solubility of H₂ in methanol in the presence of the reaction species for the hydrogenation of *p*-nitrotoluene and adsorption of the reaction species (viz. H₂, *p*-nitrotoluene, *p*-toluidine and water) from their methanol solutions on Raney Ni were investigated at the reaction temperatures.

A detailed kinetics of hydrogenation of *p*-nitrotoluene on Raney Ni was studied in a stirred, three-phase slurry reactor.

Shri Chaudhari, who worked under the guidance of Dr V.R. Chaudhari, was awarded Ph.D. degree by Poona University for his thesis based on the study. □

Synthesis of terpenoids and epoxides

A few naturally occurring oxygenated oxiranes related to thymol have been synthesized by Shri Y.S. Sanghvi, a research fellow, who worked in the Organic Synthesis Division of National Chemical Laboratory (NCL), Pune. As some *o*-isopropenylphenols obtained by the action of alkali on 4-methylcoumarins were reduced when ethylene glycol was used as solvent, the side reaction was avoided by changing the solvent system. The identity of the compounds synthesized was established by comparison of their spectral data with those of authentic samples.

The epoxidation of a number of allylic alcohols having ethylenic linkage

exocyclic to a 6-membered ring was studied by employing the Sharpless method (*tert*-butyl hydroperoxide-vanadium catalyst). All the alcohols studied had hydroxyl in the equatorial conformation. Epoxidation occurred to a significant extent from the side *trans* to the hydroxyl group. The various *cis*- and *trans*-epoxy alcohols were separated and their structures established by reducing them to the corresponding diols with lithium aluminium hydride. The diols thus obtained were compared with authentic samples.

The use of coumarins as intermediates for the synthesis of terpenes was also examined. 4,7-Dimethylcoumarin was hydrogenated and the resulting products were characterized; some of the components of the mixture were obtained in pure form by employing a novel chemical method. A number of menthol derivatives with the isopropyl group functionalized were isolated in pure form. These would be useful in the synthesis of bisabolanes having well-defined stereochemistry.

Optically active benzyl oxirane was synthesized through a new route which employs D-mannitol as a key intermediate. Saffrole oxide was prepared through a new route. In this connection, the lithiation of 3,4-methylenedioxybromobenzene was examined.

Shri Sanghvi, who worked under the guidance of Dr A.S. Rao, was awarded Ph.D. degree by Poona University for his thesis based on the studies. □

PROGRESS REPORTS

CDRI Annual Report: 1980-81

The annual report of Central Drug Research Institute (CDRI), Lucknow, for 1980-81, published recently, presents the R&D activities of the institute under its fourteen programmes of work. Five of these are devoted to the development of new therapeutic and immunotherapeutic agents for parasitic diseases: malaria, filariasis and other helminthic infections, amoebiasis, cholera and mycobacterial infections. The rest nine are concerned with cardiovascular and

nervous systems, carbohydrate and lipid metabolism disorders, cancer, viral immunology, antifertility agents, natural products, new drug delivery systems, fermentation technology, and process development of drugs and pharmaceuticals.

The processes for primaquine, the only drug available for treatment of relapses in malaria, and bumetanide, a diuretic, were developed and released to the respective sponsors: I.D.L. Chemicals Ltd, Hyderabad, and Kembiotic Collaborators, Bombay. The process for sulphamethoxazole, an antibacterial, was demonstrated to Dolphin Laboratories Ltd, Calcutta, and work was completed on the processes for metronidazole (antiprotozoal) and trimethoprim (antibacterial), under the sponsorship of Unichem Laboratories Ltd, Bombay.

The fermentation process for the production of *l*-acetylphenylcarbinol, the intermediate for *l*-ephedrine, released earlier to Indian Yeast Co. Ltd, Calcutta, was adapted so that a different strain of yeast could be used.

The new cervical dilator Isapient I was under commercial production at Unichem Laboratories, Bombay. An improved version of the dilator, Isapient II, now offered by CDRI provides the desired degree of dilation in 5-6 hr as compared with 10-14 hr obtained with the first. Trials of the new version were successfully performed in more than 650 cases. The commercial Ayurvedic preparation B-Gynol, which had earlier shown encouraging results in the control of post-IUD insertion bleeding in women, was found to be non-toxic to rodents. Clinical trials of the preparation were being taken up by Indian Council of Medical Research. A formulation of methyl cyanoacrylate supplied by World Health Organisation was found to exhibit satisfactory tubal and vasa occluding properties.

Multicentric clinical trials of the local anaesthetic Centbucridine were completed in 1500 cases of ophthalmic, dental and general surgery. The drug

compared well with the other anaesthetics lignocaine and bupivacaine. Efficacy and tolerance studies (clinical trial phase II) of Gugulipid, a hypolipidaemic product from *Commiphora mukul*, were completed and data were being compiled for submission to the Drugs Controller (India) for taking up phase III trials. A neuroleptic, effective in schizophrenia, and an antidepressant, were in clinical trial (phase II).

Two attenuated strains of cholera vibrio obtained by genetic recombination were under development as a live bivalent vaccine. It was found that phenol-killed bivalent vaccine was as potent as the live vaccine. A *Mycobacterium habana* strain showed immunogenic property comparable to that of BCG (Phipps) against *M. tuberculosis* infection in mice and guinea pigs.

Chronic, non-fatal *Plasmodium knowlesi* malaria infection was developed in bonnet monkey. Schizont-infected red cells were cultured *in vitro* to produce merozoites in a cell-free state, and the purified merozoites were found to be metabolically active and non-infective *in vitro* and *in vivo*. Bonnet monkeys which survived primary infection due to inoculation with parasitized-RBC showed acquired immunity. Erythrocytic stages of *P. berghei* cultured *in vitro* were found to be infective to mice and mastomys up to the seventh day of culture; the cultured parasites were immunogenic in surviving animals. Pregnant monkeys infected with *P. cynomolgi* showed significant increases in the peak level, duration and patency of parasitaemia compared to non-pregnant animals.

Clofazimine, an antileprosy drug, showed activity against both microfilariae and adult worms of *Litomosoides carinii* in cotton rats and microfilariae of *Dipetalonema vite* in mastomys. A combination of diethylcarbamazine (microfilaricidal) and furazolidone (macrofilaricidal) was found to be effective against both the stages of *L.*

carinii. In the intradermal test for serodiagnosis of *Wuchereria bancrofti*-infected microfilaria-negative cases in endemic areas, infective larval antigen of *Brugia malayi* was found to be superior to the adult worm antigen in subjects below 20 years and inferior in the group above 20 years.

Studies on serodiagnosis of invasive amoebiasis patients were continued in collaboration with Osmania Medical College, Hyderabad, using lyophilized antigen prepared from *Entamoeba histolytica*. It was possible to obtain clones of *E. invadens* and *E. histolytica*.

Subdermal implant of a combination of rifampicin and microencapsulated rifampicin with bioabsorbable material provided controlled release of the drug in animals; the blood concentration of the drug was maintained above the therapeutic level for more than 120 days. Carbamyl analogues of phosphatidylcholine synthesized as drug carriers were found to have better properties than lecithin/cholesterol liposomes.

Studies on adrenoceptive cortical neurones of rats indicated the possible occurrence of specific noradrenergic and dopaminergic receptors and perhaps of a less defined catecholamine receptor on which noradrenaline and dopamine and their antagonists act. Catecholamine receptors might represent a pharmacological rather than a physiological response to the amines.

The maturation of sperms in rats and monkeys was found to be accompanied by a 65% reduction in their zinc content. Treatment of the rats with microdose of estrogen interfered with the reduction during epididymal transport of spermatozoa, thereby suggesting that the antifertility effect of estrogen may be due to the inhibition of sperm maturation. The zinc level in the epididymal spermatozoa could therefore be used as a marker of sperm maturation.

The Neuropharmacology Unit at K.G.'s Medical College, Lucknow, and Clinical Pharmacology Unit at Seth G.S. Medical College, K.E.M. Hospital,

Bombay, both supported by CSIR, were taken over by CDRI as its extension centres.

One hundred and ninety-eight research/review papers were published; twelve patents were filed in India. □

Fuel Science and Technology

A new quarterly journal, *Fuel Science and Technology*, has been started by Central Fuel Research Institute (CFRI) Dhanbad. The first issue (July 1982) has been brought out.

The journal publishes original research papers of fundamental nature as well as findings of research and development activities, critical reviews on topics of current interest, and short communications/letters. The scope of the journal includes all major fuels, coal, oil, gas and their derivatives but with emphasis on coals, their nature, resources, conservation, preparation/beneficiation as well as processed fuels, combustion, gasification, byproducts such as coal-tar and/or industrial intermediates for use as chemicals, fertilizers, coal conversion, particularly coal-to-oil, fundamental studies relating to system, structure and behaviour of coal as well as non-fuel uses like coal fertilizers, industrial carbons, carbon artefacts, and reductants.

The inaugural issue, which contains six articles, besides short communications, is representative of the journal's scope. These are: (1) Status and prospects of coal fertilizer and coal-acids; (2) An integrated scheme for oil agglomeration and hydrogenation of high-ash coal; (3) Coal resources of India—formation, distribution and utilization; (4) Molecular sieves for oxygen enrichment of air; (5) Origin and mode of occurrence of pyrite in Assam coals; and (6) Synthesis of maleic hydrazide. All the papers, including short communications, are authored by CFRI scientists.

The institute's quarterly bulletin *FRI News* has been discontinued con-

sequent on the starting of the new journal.

Annual subscription to the new journal is Rs 40 (£8; \$18) and single copy is priced at Rs 10. Enquiries relating to the journal may be addressed to: Principal Editor, Fuel Science and Technology, Central Fuel Research Institute, Dhandad 828 108. □

CECRI brochures on R&D activities

The Central Electrochemical Research Institute (CECRI), Karaikudi, has brought out two brochures, one on its achievements and the other on its services rendered to industry.

The brochure on its R&D activities shows that the institute has contributed handsomely in six areas of electrochemical science and technology which it has been pursuing, namely Electrochemical power sources; Electrochemicals (inorganic as well as organic); Corrosion and its control; Electrometallurgy, electroplating and metal-finishing; Electroanalytical chemistry and electrochemical instrumentation; and Solid-state electrochemistry.

The brochure on its services to industry reveals that the institute has released 79 processes/products to industry and as many as 48 are ripe for release.

The brochures may be obtained from the Director, CECRI, Karaikudi 623 006. □

Electrochemical Science & Technology Information Services at CECRI

The Central Electrochemical Research Institute (CECRI), Karaikudi, is organizing its information services to provide information relating to electrochemical science and technology. In some areas like corrosion and its prevention, CECRI's information services are already being used to a considerable extent.

Information of an indicative nature, such as the name of the manufacturer or

supplier or the source of information, will be charged at the rate of Rs 100 per enquiry, and information concerning performance data, retrospective searches, references to status reports, reviews, etc. at the rate of Rs 500 per request.

Those seeking information may contact the Director, Central Electrochemical Research Institute, Karaikudi 623 006. □

DEPUTATION BRIEFS

Dr D.C. Goswami

Dr D.C. Goswami of Regional Research Laboratory, Jorhat, participated in a planning group meeting on 'Science for All' held at Bangkok, 20-23 July 1982, under the auspices of Unesco. Attending the meeting as nominee of the Indian government, Dr Goswami reports: The group discussed the present status of dissemination of science in a number of countries and worked out a detailed plan for a regional meeting, scheduled for March 1983, of 29 countries in Asia and Pacific on 'Science for All'. The group identified four target groups, viz. (i) those who are in school, (ii) those who should have been in school, (iii) the labour force, and (iv) the educated section, for effective science education.

Dr Goswami presented the Indian efforts on curriculum development, teachers' training and mass education in science in general, and the role of voluntary bodies in popularization of science in particular. At the request of Unesco, Dr Goswami will prepare, for the regional meeting, a paper on the problems of science education and the strategies for creation of a science climate, incorporating the Indian experience. □

Shri V.K. Batra

Shri V.K. Batra of National Physical Laboratory (NPL), New Delhi, participated in the ninth meeting of the Indo-Soviet Working Group held in Moscow,

21-27 June 1982, as a member of the Indian delegation.

Shri Batra's report: At the meeting, experts considered the fulfilment of the themes of the plan for scientific and technical cooperation on standardization and metrology for 1982, discussed a wide range of problems concerning investigation and implementation of the results of the joint work, and expressed satisfaction with the progress in cooperation. Among other things, the plan for scientific and technical cooperation in metrology for 1982-83 was agreed on and further cooperation was discussed. Besides continuation of the work on intercomparison of the national standards of radio frequency measurements, direct-current voltage and resistance, capacitance and inductance, the working programme for pressure and vacuum measurements, national time and frequency standards through a transportable quantum clock, and standard reference data on physical constants and properties of substances was finalized.

Earlier, Shri Batra visited D.I. Mendeleyev Institute of Metrology (VNIIM), Leningrad, from 6 June for carrying out several (international) intercomparisons of NPL measurement standards of direct-current voltage (emf), resistance and capacitance with the corresponding USSR standards. During this period, he got acquainted with the USSR state standards of the electromotive force unit based on Josephson's junction; with the technology for preparation of Josephson's junctions, methods and instruments for comparisons of standard cells, standard resistors and capacitors; with the work of VNIIM on the absolute reproduction of the ampere based on the levitating mass; and with the methods and instruments for studying semiconducting Hall structures. A joint experiment on studying the point Josephson junctions with niobium monocrystal used at VNIIM was also carried out.

□

PERSONNEL NEWS

Dr P.A. Paranjpe appointed Distinguished Scientist

Dr Pramod A. Paranjpe, head of the Propulsion Division of National Aeronautical Laboratory (NAL), Bangalore, has been appointed distinguished Scientist in the director's grade (24 July 1982).

Dr Paranjpe (born 1 April 1934) obtained B.Tech (Hons) in mechanical engineering from Indian Institute of Technology, Kharagpur, in 1955 and proceeded to Switzerland to work in R&D divisions of turbomachinery industry. He obtained D.Sc. Tech. degree from Swiss Federal Institute of Technology (ETH), Zurich, in 1963.



Returning to India in 1964, Dr Paranjpe joined IIT, Kanpur, and moved over, in 1966, to NAL as head of the then newly set up Propulsion Division. It is largely due to his initiative and leadership that a turbomachinery and combustion laboratory has been established at NAL. This UNDP-aided project was adjudged by Unesco as one of the best in the region.

Dr Paranjpe has carried out pioneering work relating to techniques for ignition and flame stabilization in afterburners of aviation gas turbines such as catalytic ignition, pyrogenic ignition and jet curtain flameholders. His work has also demonstrated that these techniques have significant advantages over the existing technology. He is also responsible for the establishment of versatile manufacturing/inspection facilities for turbine and compressor blades.

Dr Paranjpe has served as consultant to various industrial organizations. He initiated and guided the designing of an organic Rankine turbopack system to examine the feasibility of producing power from low-temperature heat sources. Based on the results of this feasibility study a project for a pilot plant, as a forerunner of the bigger plants, to use geothermal energy has been started in collaboration with Geological Survey of India.

A recipient of FIE Award (1978) of Rs 25,000 for his meritorious contributions in turbomachinery engineering, Dr Paranjpe is a fellow of the Indian Academy of Sciences. He is coordinator for India in the Commonwealth Aeronautical Advisory Research Council, and coordinator of Propulsion Panel of Aeronautical Research and Development Board. In 1971 Dr Paranjpe went to National Aeronautics and Space Administration's Lewis Research Centre, USA, as a Visiting Scientist.

For a more detailed account of Dr Paranjpe's work, especially in Switzerland, see CN 28(1978), 129. □

Appointments/Promotions

Shri A.K. Seth

Shri Ashoka Kumar Seth, head of National Environmental Engineering Research Institute's zonal laboratory at Jaipur, has been promoted as Scientist EI (1 March 1981).

Shri Seth (born 2 Jan. 1938) is a B.E. (Hons) in civil engineering of Jabalpur University (1961) and an M.E. of Roorkee University (1964). With NEERI since November 1964, he visited FRG in 1971 under the CSIR-German Academic Exchange Programme. In 1974 he was deputed as expert to Iraq's Ministry of Industry & Mines, where he rendered consultancy services and helped design wastewater treatment units for various industries. He was in charge of NEERI's Delhi zonal laboratory during 1970-74 and is heading the Jaipur zonal laboratory

since 1979. Has 20 papers/reports to his credit.

Also at National Environmental Engineering Research Institute, Nagpur, the following have been promoted, on assessment, as Scientist C: Shri S.S. Mudri (Hyderabad zonal laboratory, 11 June 1979), Dr C.K. Kale (1 Oct. 1980), and Dr S.R. Joshi (19 Nov. 1981).

Dr A.V. Rao

Dr A.V. Rao of Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, has been promoted as Scientist EII (4 March 1982).

Dr Rao, who graduated in science with distinction from Madras University in 1954, received his post-graduate degree in chemical engineering in 1956 from the same university. With CSMCRI since 1956, Rao was awarded Ph.D. degree in 1975 for his work on ultrafiltration membranes. Promoted as Scientist EI in March 1975, he has since been the discipline coordinator of the Reverse Osmosis Division.

It is largely because of the know-how developed by him that the seaweed chemical industry has been firmly established in the country. Dr Rao has also received two awards from the Inventions Promotion Board of National Research Development Corporation of India for the know-how for agar and sodium alginate.

Dr Rao served as an FAO expert for three months in Alexandria, Egypt, when he modernized its agar-agar plant. Under CSIR-DAAD Exchange of Scientists Programme, Dr Rao visited several institutions engaged in reverse osmosis, electrodialysis and ultrafiltration in FRG and Switzerland. Deputed as a consultant to Central Research Organisation, Rangoon, for two months in 1981, Dr Rao developed technology for the extraction of sodium alginate from Burmese seaweeds and assisted CRO in the pilot plant operation.

An associate member of Indian Institute of Chemical Engineers since 1962, Dr Rao has to his credit more than 60 research papers and two patents.

At Regional Research Laboratory (RRL), Jammu, Dr K.L. Bedi has been appointed on promotion Scientist C (10 May 1982) and Shri V.K. Vakhlu, Scientist B (30 April 1982). Those promoted consequent upon assessment at this laboratory are: Shri V.S. Gandotra (Scientist B, 9 Feb. 1981), Shri M.L. Sharma (Scientist B, 24 Feb. 1981), Shri C.N. Gaiind (Scientist B, 21 June 1981), Shri V.V.N. Rao (Scientist B1, 30 July 1979), and Shri D.V. Rawal (Library Officer A, 20 June 1980). □

At National Chemical Laboratory, Pune, the following have been appointed Scientist B with effect from the dates given in parenthesis: Dr (Mrs) V.S. Gupta (30 March 1982), Dr R.S. Jolly (31 March 1982) and Shri S. Mukhopadhyay (30 April 1982). □

Honours & Awards

Dr S. Kumar

Dr S. Kumar, Director, Central Glass & Ceramic Research Institute, Calcutta, has been reappointed chairman of the glassware sectional committee of Indian Standards Institution.

Prof. P.K. Jena

Prof. P.K. Jena, Director, Regional Research Laboratory, Bhubaneswar, has been appointed chairman of the coordination council for the engineering sciences group of CSIR laboratories for a period of two years effective 1 August 1982 in place of Prof. V.A. Altekar, Director, National Metallurgical Laboratory, Jamshedpur. □

PATENTS FILED

23/Del/82: Process for the preparation of 17-B(1-oxoheptyloxy)19-norpregn-4-en-20-yn-3-one and esters thereof, K. Lal, P. Kole & Suprabhat Ray—Central Drug Research Institute, Lucknow. □

ANNOUNCEMENTS

Course on Experimental Stress Analysis Techniques and Applications

A course on Experimental Stress Analysis Techniques and Applications is proposed to be conducted by Structural Engineering Research Centre, Madras, during 17-29 January 1983. The course is meant for engineers and scientists from industries, consultancy firms, government organizations, universities, and research institutions who are already engaged in stress analysis techniques.

The course content: Basic elasticity, similitude laws; design of experiments; choice of model materials; strain gauge techniques; two- and three-dimensional photoelasticity; Moire' techniques; holographic interferometry; Speckle techniques; static, dynamic, and vibration measurements; measurements in model and prototype; non-destructive testing techniques; optical processing techniques; residual stress measurements; and data reduction/and numerical processing of experimental results.

Applications for the course, in the prescribed pro forma, should reach the Coordinator, Dr R. Narayanan, before 30 November 1982. Further details may be obtained from the coordinator. □

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Advertisement No 44/82

The Council proposes to appoint two Scientists F in National Institute of Oceanography, Dona Paula, Goa. One of the posts is in the area of training programmes, preparation of ocean profiles, planning and coordination; and the other is in the area of electronic data processing, development of information systems, publications, project evaluation and costing. The pay scale is Rs 2000-125/2-2500 plus allowances. Prescribed forms for sending the *curriculum vitae* are obtainable from Chief (Administration), Council of Scientific & Industrial Research, New Delhi 110001, from whom further details may also be obtained. Completed pro forma should reach CSIR on or before 14 October 1982. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

C.F.T.R.I., MYSORE

VOL 32 NO 17 15 SEPTEMBER 1982

CSIR to collaborate with Department of Electronics

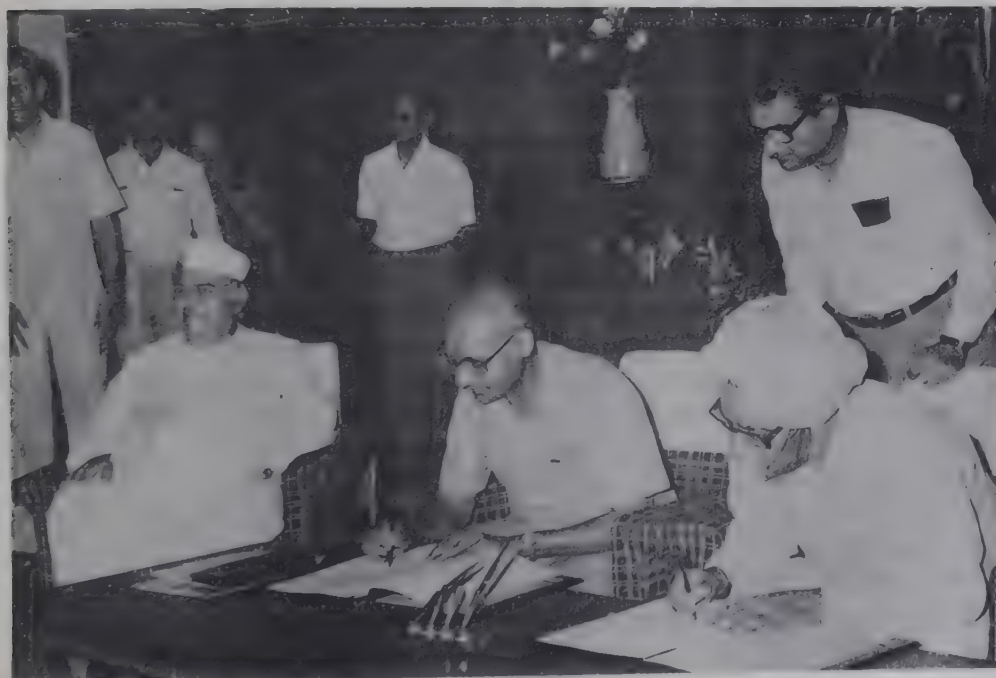
The Council of Scientific & Industrial Research and the Department of Electronics have decided to collaborate for meeting the emerging electronics requirements of the country in well-identified areas on a self-reliant basis. For this purpose, a five-year memorandum of understanding has been signed between the two organizations to utilize to the maximum extent the expertise available in six CSIR laboratories involved in electronics. These are: Central Electronics Engineering Research Institute, Pilani; National Physical Laboratory, New Delhi; Central Scientific Instruments Organisation, Chandigarh; National

Institute of Oceanography, Goa; National Aeronautical Laboratory, Bangalore; and National Geophysical Research Institute, Hyderabad. The laboratories will interact directly with the Department of Electronics and work out specific technology development projects to be achieved in their respective areas of expertise in accordance with the memorandum. For its part, the Department will establish suitable linkages with public-sector electronics companies for utilizing the results of such research.

The memorandum was signed on 24 August 1982 at CSIR Headquarters, New Delhi, by Dr G.S. Sidhu, Director

General, Scientific & Industrial Research, and Dr P.P. Gupta, Chairman, Electronics Commission, and Secretary, Department of Electronics.

The thrust areas in electronics have been identified laboratory-wise. These include large-scale integrated (LSI) semiconductor circuits in collaboration with the Semiconductor Complex Ltd; electronic instrumentation for the sugar and paper industries; power semiconductor devices in cooperation with companies such as Bharat Heavy Electricals Ltd; materials development; primary standards; medical electronics; fibre optics; lasers and other opto-electronic devices; and marine and geophysical instrumentation with special reference to remote sensing. □



Signing the memorandum of understanding between CSIR and the Department of Electronics are Dr G.S. Sidhu (right), Director General, CSIR, and Dr P.P. Gupta (middle), Chairman, Electronics Commission. Prof. S. Nurul Hasan, Vice President of CSIR, is seen to the right of Dr Gupta

UGC-Hari Om Ashram Awards for Prof. Mitra and Prof. Bachhawat

Prof. A.P. Mitra, Director, National Physical Laboratory, New Delhi, and Prof. B.K. Bachhawat, Director, Indian Institute of Chemical Biology, Calcutta, figure among the eleven scientists selected for the University Grants Commission—Hari Om Ashram Trust Awards for 1979 and 1980.

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Prof. Mitra has been selected for the C.V. Raman Award (1980) for experimental research in physical sciences (he shares the award with Prof. P.T. Narasimhan of Indian Institute of Technology, Kanpur). Prof. Bachhawat gets the J.C. Bose Award (1980) for research in life sciences (he shares the award with Prof. U.S. Srivastava of Allahabad University).

Instituted by Hari Om Ashram Trust, Nadiad, these awards are administered through University Grants Commission. The award comprises a cash of Rs 10,000. Brief accounts of the prizewinning researches:

Prof. A.P. Mitra

The award made to Prof. Mitra is in recognition of his outstanding contribution in radio science and his work on the changing environment.

The Radio Science Division, created, guided and headed by Dr Mitra since its inception, has over the years gained an international character and a national



status in areas on radio communication through the ionosphere and troposphere, in the study of our atmospheric environment and in devising new techniques for the study of this environment. He has introduced an entirely new research activity on tropospheric propagation and monitoring through introduction of new techniques, consolidated the International Solar-Geophysical services through the operation of Associate Regional Warning Service, and has

undertaken theoretical and initial experimental studies of ionospheric modification by high-power radiowave heating. His book on *Ionospheric effects on solar flares*, since translated in Russian, is a reference document on solar flare effects. His very recent work on human influences on the atmospheric environment and, in particular, on the ozone problem in the stratosphere and the problem of spacecraft effluents in the upper atmosphere are of considerable significance. In these he has sought to take a total view in which both natural and human influences are simultaneously operating, and in this wide canvas, spread over different levels and a wide range in time, he has examined the extent of effects of these influences on our environment—in the troposphere, the stratosphere and the outer reaches of the atmosphere.

Prof. Mitra has played an important role in developing ionospheric and space research in India, and a critical role in international activities of URSI and COSPAR. He is the vice president of URSI, the only Asian to be so elected; was a Jawaharlal Nehru Fellow (1978-80) and recipient of Shanti Swarup Bhatnagar Prize in physical sciences in 1968; and has been the Asian editor for over 15 years of one of the most prestigious journals in ionospheric physics: *Journal of Atmospheric and Terrestrial Physics* (UK).

* * *

Prof. B.K. Bachhawat

Since joining the institute as its Director in 1976, Prof. Bachhawat's major contributions have been in three directions: (i) studies on enzyme-linked immunoassay techniques; (ii) development of specific drug and enzyme delivery systems for pathological conditions; and (iii) studies on specific carbohydrate-binding proteins (lectins).

Using an elegant method of employing protein-protein monoconjugates developed in his laboratory, his group have devised a sensitive immunoassay

technique for the determination of circulating myoglobin whose level serves as an indicator of myocardial conditions.

Another of Prof. Bachhawat's recent achievements centres on the successful



direction of liposome-entrapped drugs through the mediation of specific ligands to parenchymal cells of liver for reversing artificially-induced hepatitis. Owing to cell-specific targeting, both the requirement and the untoward side effects of the drug are minimized. This work has led to extensive research aiming at suitable tailoring of liposomes for modification of its targeting characteristics.

Prof. Bachhawat's team have isolated a carbohydrate-binding lectin from the haemolymph of the horseshoe crab available in the coastal regions of the Bay of Bengal. This lectin, called carnoscorpin, specifically binds sialic acid residues of sialoglycoproteins. In the immobilized form this substance successfully resolves microheterogeneity owing to differences in sialic acid content of alkaline phosphatases. Since the technique is sensitive to variations in both the content and type of carbohydrate chain, the method is of high utility. The amoebocytes of the haemolymph of this animal contain a protein-clotting system which is activated in the presence of lipopolysaccharides of gram-negative bacteria. The amoebocyte lysate can sensitively detect and quantitate bacterial pyrogens and has been utilized for the development of a technique for the detection of pyrogens in biological and parenteral fluids. □

Cross-slicing—a new method of mining steep thick seams

The bord and pillar system is still a widely practised method of coal mining in India. But it has been proved inefficacious for mining thick seams. It has resulted in high losses in exploitation, and hence low productivity, and led to incidence of spontaneous heating. High inclinations of seams have further aggravated the problem. Thick seams account for 75% of the total coal reserves in India. Hence, winning such seams is a challenge to researchers and mining personnel.

A new method of mining, known as cross-slicing, has been evolved by Central Mining Research Station, Dhanbad, on the basis of the trend of the roof coal deformation and the orientation of the prominent fracture plane formed during the horizontal slicing in ascending order.

Eleven slices have been worked in a model by this method in ascending order in conjunction with stowing without any strata control problem. Surface subsidence was only 2.5%. This will ensure better packing, lesser strata control problems and negligible surface subsidence, resulting in stability of overlying old workings and surface features. At the same time it will yield better recovery and higher production. Preparations are in hand to try this method in collaboration with Bharat Coking Coal Ltd. □

NML's technology on electrolytic manganese dioxide utilized in Burma

The technology on the production of electrolytic manganese dioxide developed by National Metallurgical Laboratory (NML), Jamshedpur, has been successfully implemented by Central Research Organisation (CRO), Rangoon. The technology was made available to CRO by National Research Development Corporation of India under the Indian Technical & Economic Cooperation Assistance programme of

the Government of India to the Government of Burma.

A 50 kg per day pilot plant has been installed and commissioned at CRO. An NML scientist, Shri S.L. Sengupta, was deputed to Burma to assist in the commissioning of the plant and also in training the Burmese personnel in plant operation. □

NML to provide consultancy for setting up graphite beneficiation plant

The National Metallurgical Laboratory (NML), Jamshedpur, has been entrusted with the consultancy services for the setting up of a graphite beneficiation plant by Tamil Nadu Minerals Ltd (TAMIN). The plant will process 100 tonnes per day of low-grade graphite from Shivaganga area of the state with a view to obtaining a concentrate suitable for crucible manufacture as well as of other marketable grades.

NML conducted bench- and pilot plant-scale investigations on low-grade graphite from the area on behalf of TAMIN who sponsored the investigation. The concentrates obtained in bench-scale studies and pilot-plant runs conform to the size and grades of desired specifications.

The consultancy assignment includes preparation of project report as well as providing assistance in the setting up and commissioning of the plant. □

Estimation of residual life of steam pipeline in Neyveli Thermal Power Station

A 'health check' by metallurgical means of the main steam pipeline of a thermal power station is a 'must' when boilers in thermal power stations complete the minimum designed hours of service life. Such a check will help make a reasonable assessment of its residual life, thereby avoiding failures at a subsequent stage and also keep provision for substituting the worn-out parts at the right time.

The National Metallurgical Laboratory (NML), Jamshedpur, had undertaken such a health check, sponsored by Neyveli Lignite Corporation, on two samples of pipes which included an on-the-spot study. The results of the investigations, since furnished to the Corporation, show that despite the designed life having been over, the tubes can continue to be used for a minimum period of another four years when a further 'health check' would be necessary. □

Interaction between cholera vibrio and mucosal surface of intestine

Adherence of cholera vibrio to the intestinal mucosa of the host is essential for the pathogenesis of cholera and a good correlation exists between adherence and pathogenicity. Inability to adhere may be due to genetical or immunological factors. Dr B.S. Srivastava and coworkers at Central Drug Research Institute (CDRI), Lucknow, have shown that the surface of the intestine has specific receptors, containing mannose or mannose-like residues, and the vibrios adhere to these receptors. Treatment of the vibrios with mannose or of the intestinal mucosa with sodium metaperiodate has been reported to cause inhibition of adherence. This has been confirmed through the isolation of a motile, chemotactic but non-adhering mutant of *V. cholerae* named CD 11. While the parent strain elaborates mannose-sensitive haemagglutinins, CD 11 does not do so. Using several wild strains of *V. cholerae* the CDRI scientists have shown that adherence can also be inhibited by treatment with glucose, sucrose or maltose. The mutations responsible for the loss of adherence of CD 11 have been mapped on the chromosome closely linked to *pur* locus. This information is important for the cloning of the gene coding for the adhering antigen and the development of a synthetic vaccine. □

Vapour pressure measurement to select volatile corrosion inhibitors

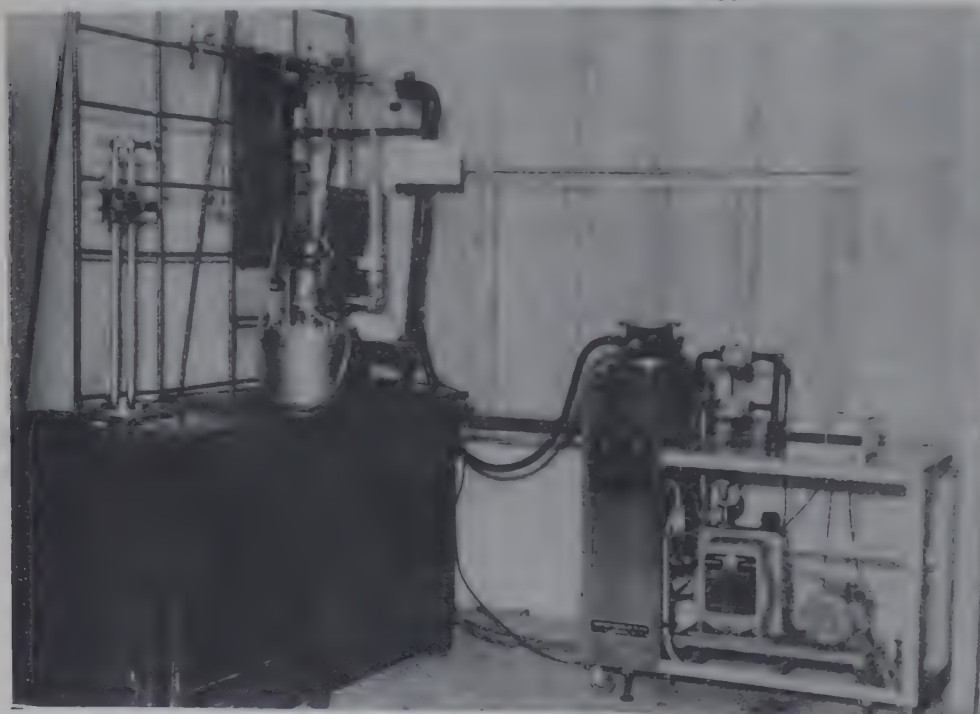
The knowledge of vapour pressure-temperature relationship in respect of a volatile corrosion inhibitor is important for the successful application of the inhibitor. The vapour pressure values help in screening chemicals for use as volatile inhibitors. One can also find out the lowest vapour pressure below which a particular chemical would cease to function as an effective inhibitor. The Central Electrochemical Research Institute (CECRI), Karaikudi, has designed and fabricated the Knudsen apparatus for determining the vapour pressures of compounds, even at high temperatures.

The method consists in measuring the effusion rate of a gas through a small orifice. The apparatus operates under high vacuum of the order of 10^{-6} mm Hg. The rate of effusion is determined by measuring the shrinkage of a highly sensitive quartz spring by using a cathetometer. Vapour pressure values obtained with the CECRI apparatus in the case of isoamyl acetate, aniline and a

number of vapour pressure inhibitors matched with the values reported in the literature. □



View of the highly sensitive quartz spring carrying a box containing the substance. The empty box should weigh less than 0.3 g. Vapour pressures of the order of 1×10^{-3} mm Hg have been determined with the apparatus



The Knudsen apparatus designed and fabricated at CECRI, Karaikudi, for measuring vapour pressure of compounds likely to find application as volatile corrosion inhibitors.

New cervical dilator NRDC awardwinning invention*

Dilatation of the cervix is required in gynaecological and obstetrical practice and is a prerequisite for therapeutic abortion. If the dilatation is performed without proper care, the cervix can be damaged, with immediate as well as long-term complications. Usually, graduated metallic dilators are employed, but the quick dilatation caused by these rigid devices often results in cervical and uterine injury, particularly in multiparous patients. Laminaria tent, made from seaweed, is also used. Though it causes a slow and gradual dilatation, it has a tendency to break and often becomes dumbbell-shaped, and consequently leads to complications. A cervical dilator which would ensure a gradual atraumatic dilatation without loss of shape has now been offered by scientists from Central Drug Research Institute (CDRI), Lucknow.

The CDRI device, named Isaptent, is a good and cheap substitute for the imported laminaria tent. The dilator is made of the seed husk of psyllium (*Plantago ovata*), the common *Isabgol*. The husk's property of swelling up to several times its original volume on coming in contact with water has been made use of in the preparation of the cervical dilator. Isaptent has been successfully tried in more than a thousand cases in about 30 different hospitals in India and abroad. By using a single device, satisfactory dilatation of the cervix (9-10 mm) has been achieved in 95% cases. Two types of Isaptent have been made; one of them brings about dilatation in 4 to 6 hr and the other in 10 to 20 hr. The degree of dilatation is not related to age, parity and gestation

*The announcement of the National Research Development Corporation of India's 1982 Independence Day Award for a team of four CDRI's scientists who have developed the new cervical dilator (Isaptent I and its improved version II) has been made in CN, 32(1982), 122. For more details on the cervical dilator, see CN, 28(1978), 190; & 29(1979), 167.

period of the subject. Isaptent provides self-lubrication, which facilitates easy removal of the device after use. It causes no damage to the cervix; the vaginal flora remains unchanged.

As *Isabgol* is a widely cultivated commercial crop in the country, the raw material is easily available. One Indian firm, Unichem Laboratories, Bombay, has started the manufacture of the cervical dilator, which is being marketed under the trade name Dilex 'C'.

Brief profiles of the inventors:

Dr N.M. Khanna

Dr Khanna, Scientist EI, is head of CDRI's Pharmaceuticals Division. Born 18 May 1924, Dr Khanna is an M.Sc. (Delhi University) and a Ph.D. (Edinburgh University). He had worked with Imperial Chemical Industries (Manchester) and J.R. Geigy A.G. (Basle). With CDRI since 1951, Dr Khanna has to his credit 67 papers and 26 patents. He visited USA under CSIR-NSF Exchange Programme in 1977. Dr Khanna's research interests are medicinal chemistry (synthetic and natural products), contraception technology, and new drug delivery systems.

Dr J.P.S. Sarin

Dr Sarin is Scientist C in CDRI's Pharmaceuticals Division. Born 25 January 1933, Dr Sarin is an M.Sc. and Ph.D. from Agra University. Prior to joining CDRI in 1958, he had worked for about six years in the laboratory of Public Analyst to the Government of Uttar Pradesh, Lucknow. An associate of Institution of Chemists (India), Dr Sarin has to his credit 25 papers and 10 patents. In 1978 he visited research laboratories and drug industries in UK under the CSIR-British Council exchange programme. Dr Sarin's research interests relate to: development of drugs from medicinal plants, of new local contraceptive agents, and devices; new drug delivery systems, and bioavailability of drugs and drug standardization.

Shri R.C. Nandi

Shri Nandi is Scientist C in CDRI's Pharmaceuticals Division. Born 18

November 1930, Shri Nandi is a B.Sc. (Lucknow University) and an associate of Institution of Chemists (India). He has been with CDRI since 1957. Earlier, he worked as analytical chemist in several government laboratories. He has to his credit 5 papers and 6 patents. Development of new formulations and biomedical devices is one of his research interests.

Dr Satyawan Singh

Dr Singh is Scientist C in CDRI's Pharmaceuticals Division. Born 18 June 1947, Dr Singh is an M. Pharm. (Banaras Hindu University) and Ph.D. With CDRI since 1969, he has published 12 papers and taken out 7 patents. Dr Singh visited Czechoslovakia for a year under the exchange programme between CSIR and Czech Academy of Sciences to study bio-availability of drugs and new drug delivery systems. □

DEPUTATION BRIEFS

Dr Amarjit Singh visits electronics R&D centres in USA

Dr Amarjit Singh, Director, Central Electronics Engineering Research Institute, Pilani, visited, during April-June 1982, a number of R&D centres concerned with electronics in USA. One of his visits was to the Electronics Research Laboratory of the University of California, Berkeley, in connection with a collaborative programme on 'Application of scanning electron beams to semiconductor devices'. Reporting his observations at various centres, Dr Singh points out that this university has recently acquired an electron-beam pattern generation system for research and development on electron-beam lithography. Going to fine line electron beam lithography is a key process in the progress from LSI to VLSI. Participating in studies directed towards going to sub-micron dimensions, Dr Singh reports that at sub-micron level, SEM observations showed scalloping phenomena. Detailed measurements showed transverse modulation correlated with

the mains frequency. Plans were worked out for further experiments, correlations with simulation results, and further exchanges of visits.

At the semiconductor device research laboratories of Stanford University, Xerox Corporation, Hewlett-Packard, and Texas Instruments, which he visited, developments in LSI/VLSI devices and facilities for fabrication and testing were the main topics of interest. At Westinghouse Research Centre his interests were on power semiconductor devices and power electronics.

Dr Singh also held discussions at the Computer Engineering Centre of Mellon Institute on the development of a computer language, I.S.P.S., and its application to CAD (computer-aided design).

The CEERI Director also attended the SEMICON WEST conference, Conference on Electronic Materials, and Device Research Conference, where, Dr Singh reports, sessions were devoted to trends in MOS, bipolar and GaAs technologies, silicon devices; device modelling; novel devices; dry processing; silicon-on-insulators; and electron-beam, X-ray and optical lithography. At the SEMICON WEST Conference, apart from technical sessions, there was an exhibition of semiconductor device manufactures, wherefrom data on equipment of interest for the proposed VLSI facilities were obtained from some of the leading manufacturers.

Visiting the Klystron Laboratory of Stanford Linear Accelerator Centre, Dr Singh participated in its research programme on going to higher powers in klystrons. The technologies dealt with in the programme concerned design of guns, and output windows, and avoidance of multipactor phenomena. Operating parameters and their influence on stability of klystron operation at high powers were studied. There were interesting new results obtained in relation to the effect of focusing magnetic field, which showed instabilities near cyclotron resonance.

This is particularly important at high power levels.

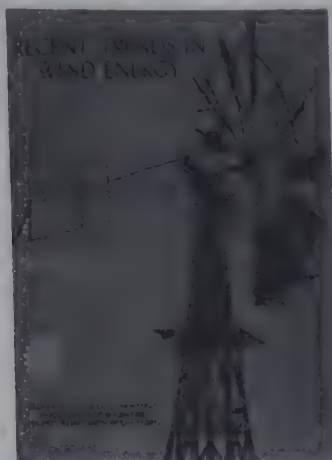
A summary of developments relating to integrated circuits has been presented by Dr Singh to the task force on LSI/VLSI set up by the Department of Electronics, of which he is a member.

Dr S.B. Kulkarni

Dr (Kum.) S.B. Kulkarni of National Chemical Laboratory (NCL), Pune, attended the international symposium on Catalytic Reactions of One-Carbon Molecules jointly organized, during 1-4 June 1982, by Katholiek University, Leuven, and Centre for Researches on Catalysis, University of Leiege, Belgium. The symposium discussed the catalytic conversions of one-carbon molecules with homogeneous and heterogeneous catalysts, the programme including 7 invited plenary lectures, 26 papers and 15 poster sessions, reports the NCL scientist. Dr Kulkarni presented a paper on 'Catalytic activity and selectivity in the conversion of methanol to light olefins'. □

Recent Trends in Wind Energy

This is the first title of the state-of-the-art report series which Indian National Scientific Documentation Centre (INSDOC), New Delhi, has started



publishing. As the title indicates, the report deals with major trends in wind energy utilization, with emphasis on

utilization potential in the Indian context. The report comprises seven chapters, the first two dealing with wind energy potential and wind characteristics. The data given in these two chapters relate predominantly to India. Concepts of wind energy conversion and their assessment in terms of performance constitute the subject matter of the next two chapters. Chapter 5 is devoted to efforts, particularly indigenous, for developing water-pumping windmills and wind electric generators. Large wind electric generators are dealt with in Chapter 6, and these developments relate to industrialized countries. The last chapter deals with technoeconomic feasibility, research, development, and testing, etc. The report is documented with about 100 references and notes.

Authored by Dr S.K. Tewari of National Aeronautical Laboratory, Bangalore, which has done pioneering work on the utilization of this renewable source of energy, the report provides valuable information to researchers and policymakers alike.

The publication (crown 4to; 146 pages; price Rs 30; \$ 10.00) is available from: Scientist in charge, INSDOC, Hillside Road, New Delhi 110012. □

PERSONNEL NEWS

Prof. P.V. Indiresan

Prof. P.V. Indiresan, Director, Indian Institute of Technology (IIT), Madras, has been appointed Adviser (Honorary)



at CSIR Headquarters, New Delhi. He holds this position concurrently with the directorship of IIT.

Prof. Indiresan obtained his B.Sc. (Hons) in physics from Presidency College, Madras, diploma in electrical communications engineering from Indian Institute of Science, Bangalore, and Ph.D. from the University of Birmingham, UK. Starting his career as a lecturer in University of Roorkee in 1953, where he rose to become Professor, Dr Indiresan moved over to IIT-New Delhi in 1965, and has taken over recently as Director of IIT-Madras.

A specialist in signal processing, Prof. Indiresan has established a School of Radar Studies, now Centre for Applied Research in Electronics, at IIT-New Delhi. Here he was also responsible for the total reorganization of the undergraduate academic programme.

In 1978 Prof. Indiresan was awarded the first prize for the most outstanding invention of the year by the National Research Development Corporation of India. This year also he has received an NRDC's Independence Day Award. Also a recipient of the Khosla Medal of University of Roorkee for the most outstanding research work in that university, Prof. Indiresan has some 20 research papers to his credit and guided ten Ph.D. scholars. □

Appointments/Promotions

Dr T.V.S.R. Appa Rao

Dr T.V.S.R. Appa Rao, Scientist EII, has been appointed Scientist F at Structural Engineering Research Centre (SERC), Madras (22 June 1982).

Dr Appa Rao (born 7 Feb. 1941) received B.E. degree with honours in civil engineering (1962) and first rank from Andhra University. As a fellow of the East-West Centre, Honolulu, Hawaii (USA), he received his M.S. degree from University of Hawaii (1965). Subsequently, he earned Ph.D. degree from Cornell University, USA (1968). After working briefly at this university as a postdoctoral research associate and as a senior staff engineer in a consulting firm in Cambridge, Massachusetts, Dr Rao returned to

India and joined SERC as Scientist C in June 1969. He was promoted to Scientist E position in 1974 and to Scientist EII position in 1981. He worked



as a Visiting Associate Professor at Cornell University for a year (1976-77).

Dr Rao's doctoral research on steel diaphragm-braced beams and columns was sponsored by American Iron and Steel Institute. Dr Rao has carried out research and consultancy assignments relating to stress analysis of nuclear containment vessels, parabolic antenna backup structures by employing experimental and/or numerical techniques such as the finite element method. His current interests are computer-aided analysis and design of cooling towers and ship structures.

* * *

Dr J. Mukerji

Dr J. Mukerji has been appointed, on promotion, Scientist F at Central Glass & Ceramic Research Institute (CGCRI), Calcutta (29 June 1982).



Dr Mukerji obtained M.Sc. (Tech.) degree in applied chemistry with specialization in glass and ceramic

technology in 1957. After working in some glass factories in India he went to France on a French government fellowship and obtained doctores sciences physiques degree (doctorat d'etat) from the University of Sorbonne, Paris, in 1962. During his stay in France he was closely associated with the French Ceramic Society and was a member of the Refractory Corrosion Commission. He also undertook production training in a refractories factory in France.

Dr Mukerji joined CGCRI in 1964 and organized its high-temperature materials and tracer laboratory. One of most significant pieces of Dr Mukerji's work is the fixation of high-level nuclear waste in glass for ultimate disposal. His present interests are non-oxide refractories and high-performance ceramics such as silicon nitride, silicon carbide and sialons, acceleration of melting and refining of glass, and lightweighting of glass containers.

As a senior guest scientist of the Max Planck Society he recently visited FRG to work on liquid phase sintering of silicon nitride. He is recipient of an award from All India Refractories Manufacturers' Association in 1980. He has published about 65 papers and contributed a chapter each on 'High Temperature Materials' and 'Refractories in Cement-making' in *Preparation and Characterisation of Materials* (Academic Press) and *Progress in the Manufacture of Portland Cement* (Pergamon Press) respectively.

* * *

Dr D. Chakravorty

Dr D. Chakravorty, head of the Advanced Centre for Materials Sciences, Indian Institute of Technology, Kanpur, has been appointed Scientist F at Central Glass and Ceramic Research Institute (CGCRI), Calcutta (6 Aug. 1982).

Dr Chakravorty (born 3 July 1937) obtained his B.Sc. (Honours) in physics and M.Sc (Tech.) in radiophysics and

electronics in 1956 and 1959 respectively from Calcutta University. After serving as a lecturer in the Department of Physics, Jadavpur University (1960-61),



he went to Pennsylvania State University, USA, and obtained Ph.D. degree in solid state technology in 1965 for his research on dielectric properties of glass under very high pressures. He joined IIT-Kanpur in 1967 and became Professor in the Materials Science Programme and the Department of Metallurgy in 1975.

Dr Chakravorty's major research interests are glass-metal microcomposites, amorphous semiconductors, electroconducting ceramics, and glass fibre technology.

Dr Chakravorty is a fellow of Indian Academy of Sciences, Bangalore, and of Indian Institute of Ceramics, Calcutta. He is on the editorial board of *Bulletin of Materials Science* (Indian Academy of Sciences).

* * *

Shri A.K. Bhatia

Shri A.K. Bhatia, Scientist C, has been appointed, on promotion, Scientist EI at Regional Research Laboratory (RRL)-Jammu (24 May 1982).

Shri Bhatia (born 4 Oct. 1942), a B.Sc. of Agra University, holds a first-class postgraduate Associateship of CFTRI in Food Technology (1964). With CSIR since 1966, he had worked at CFTRI's experimental stations at Simla and Ludhiana earlier. Moving over, on promotion, as Scientist B and transfer to RRL-Jammu in 1970, he became Scientist C in 1975.

As project leader of the food technology team, Shri Bhatia has paid attention to the utilization of regional food resources, especially utilization of solar energy for drying fruits—a process adopted at grass-root level in Ladakh area. His researches have helped decode the role of 'Dhatakpushpa', an age-old inoculum used for fermentation of Ayurvedic *asavas* and *aristas*. A modern industrial unit for preparing fermented Ayurvedic drugs has come up as a result of his work. His work on 'chhang', the country beer of the people in trans-Himalayan regions, led to industrialization of this tradition art. The first ever unit to produce carbonated pasteurized chhang is coming up at Leh. Also to his credit stands the technology for processing of in-shell walnuts and mechanization of the process and their commercialization.

For his work on upgrading tart apple juice by using ion-exchange resins, he won the All India Food Preservers Association's Yezdi Award (1979). His current interests include dietary pattern of the primitive societies of India. At present he is chairman of the Food Technology Division. □

Honours & Awards

Dr V.R. Balasubrahmanyam

Dr V.R. Balasubrahmanyam of National Botanical Research Institute, Lucknow, has won the 'Food for the Future' award of Rs 1500 (third prize), instituted by *Farmers' Journal*, New Delhi, for his paper 'When grapes are not sour' published in Vol. 1, No. 6 (October 1981), pp. 41-44 of the journal.

In the prizewinning paper, Balasubrahmanyam outlines the latest techniques in the cultivation and marketing of grapes to enable the viticulture industry in the country to establish itself on a sound economy. He also explains how, through judicious regulation of the growth cycle of the vine, it is possible to circumvent the hazards posed by the peculiar climatic conditions of the subtropics. Besides

suggesting measures to increase the export of fresh grapes to Gulf countries, the author outlines a package of practices to be followed by grape growers to get economic returns from grape culture. □

PATENTS FILED

44/Del/82: An improved process for the catalytic alkylation of benzene to ethylbenzene, R. Ratnasamy, Kum. S.B. Kulkarni, V.P. Shiralkar, G.P. Babu & Kum. K.H. Chandawar—National Chemical Laboratory, Pune.

50/Del/82: Improvements in or relating to the preparation of blue photoluminescent zinc sulphide silver phosphor, C.V. Suryanarayana & Smt. Alice Murian—Central Electrochemical Research Institute, Karaikudi.

53/Del/82: Process for *in situ* preparation of indelible ink for making a permanent mark on a substrate, P.K. Gupta, B.G. Mathur & Smt. V. Raman—National Physical Laboratory, New Delhi.

78/Del/82: An improved process for the preparation of substituted aromatic diamines, N.D. Ghatge & N.N. Maldar—National Chemical Laboratory, Pune.

79/Del/82: An improved spinning pot used for twisting and winding synthetic textile yarns, R.V. Ramani—National Aeronautical Laboratory, Bangalore.

97/Del/82: Process for the preparation of 6-O-stearoyl-N-acetylmuramyl-L-alanyl-D-isoglutamine, R.K. Jain, C.M. Gupta & Nityanand—Central Drug Research Institute, Lucknow.

137/Del/82: An improved process for single step processing of leather, D.R. Rao, K. Vijayalakshmi, K. Geetha & V.V.M. Rao—Central Leather Research Institute, Madras.

178/Del/82: A process for the preparation of O-carbamoylsalicylates, A. Kamal, P.B.R. Sattur & G. Thyagarajan—Regional Research Laboratory, Hyderabad.

179/Del/82: Improved boring and skirting device for pile foundations in civil engineering works, J.P. Kaushish,

D.K. Gautam, M.S. Kalra, B.G. Rao & M.L. Soni—Central Building Research Institute, Roorkee.

275/Del/82: Process for the preparation of dimethyl-4-ethyl-4-formyl pimelate, S.C. Pakrashi, V.S. Giri, & Esabak Ali—Indian Institute of Chemical Biology, Calcutta.

360/Del/82: A process for conversion of limonene to carvyl chloride, B. Ravindranath & P. Srinivas—Central Food Technological Research Institute, Mysore. □

ANNOUNCEMENTS

International Conference on Water Hyacinth

An international conference on Water Hyacinth is being organized from 7 to 11 February 1983 by CSIR in cooperation with the Commonwealth Science Council, London, and the United Nations Environment Programme, Nairobi, at Regional Research Laboratory, Hyderabad. The objectives of the conference are: (i) to highlight the problem of infestation of waterways by water hyacinth (*Eichhornia crassipes*); (ii) to critically examine methods available, or likely to become available, for controlling the weed; (iii) to utilize to best advantage those methods which show promise in developing countries; and (iv) to identify directions for continued R&D. The conference topics are: Environment and Ecology, Biology, Chemistry, Engineering, Utilization and Control—chemical, mechanical and biological. The conference programme consists of plenary lectures, invited papers, and contributed papers.

The deadline for submission of abstracts of papers (invited as well as contributed) is 15 October 1982, and that for full papers, 31 December 1982. The last date for registration is 30 November 1982.

For further details, participants may write to International Conference on Water Hyacinth, c/o Dr G. Thyagarajan, Director, Regional Research Laboratory, Hyderabad 500 009. □



CECRI's get-togethers with industry

To benefit the electrochemical industry and in turn to benefit from this industry, Central Electrochemical Research Institute (CECRI), Karaikudi, organized two get-togethers on 30 and 31 August at its extension centre at CSIR Complex, Madras. The first get-together of the scientists from the institute was with the representatives of electroplating and metal-finishing industries. Following two technical sessions, at one of which the CECRI scientists presented their work in relation to this industry and the other in which the industries' representatives put forth their problems and suggestions, the get-together made principally four recommendations. Three of them, addressed to the institute, were that CECRI should: (i) consider bringing out handbooks on electroplating and metal-finishing in different regional languages; (ii) develop instruments for measuring various parameters like thickness, brightness, stress, etc. in order to help the industry achieve quality electroplating; and (iii) organize short-term courses in plating on plastics, and analysis of plating solutions for short-term duration, at the specific request of the industries at cost. The get-together also recommended that the industries on their part should form their own associations and sponsor problems of importance to be solved by the institute.

The second get-together was with alkali chlorine industries to discuss the programme of work on the new project concerning cell design, anodes and cathodes for new types of chlor-alkali cell. This meet brought to fore the

development in advanced countries of membrane technology, which prevents pollution and brings down energy consumption in the production of caustic soda. There was also a reference to the futuristic version of the membrane cell, called solid polymer electrolyte (SPE) cell. Since the production of caustic soda during the eighties was expected to be doubled, the emphasis was on the need to examine what indigenous R&D could do to help the chlor-alkali industry to improve the process, reduce energy consumption, and bring about better control over pollution.

Recommendations arising as a result of deliberations were that: (1) Further studies should be directed towards reducing energy consumption; (2) CECRI should lay priorities on the following projects in the same order: (i) characterization of the metal anode and quality control, (ii) coating by surface alloying, (iii) development of Raney nickel and other types of cathode material to improve performance, and (iv) zero gap design of cells; (3) Central Salt & Marine Chemicals Research Institute, Bhavnagar, should conduct studies on the preparation of very pure salts from brine; (4) Preparation of caustic soda by molten electrolysis using ceramic diaphragms may be taken up as a long-term research project; and (5) Studies on oxygen-consuming cathodes may also be taken up. □

Newer roof supports in mines

Roof control is a major problem in underground coal- and non-coal mines. The conventional wooden supports are

becoming progressively scarce, expensive and ineffective for introducing mechanization. A novel method of roof support, called 'roof stitching', developed by Central Mining Research Station (CMRS), Dhanbad, gets round most of the above problems. Using waste ropes, CMRS has successfully introduced this type of support in more than 100 coal-mines with considerable savings in support cost. This method was further improved by supplementing grouted bolts.

Full-column grouted bolts were introduced for ground support in mechanized copper mines, resulting in improved productivity and savings in support cost.

The other supports developed include Safari support, screw prop, triangular steel chock, and others. These supports, being introduced extensively in mines, help reduce roof fall accidents, which are normally 50% of the fatal accidents. The roof stitching and Safari supports have won the National Research Development Corporation of India's award.

As the supports developed are greatly economical and effective in comparison with the conventional supports, they have been widely accepted by the mining industry. Also, in view of the greater

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safety ensured for miners working under freshly exposed roof, the Director General of Mines Safety has recommended the extensive use of these supports. □

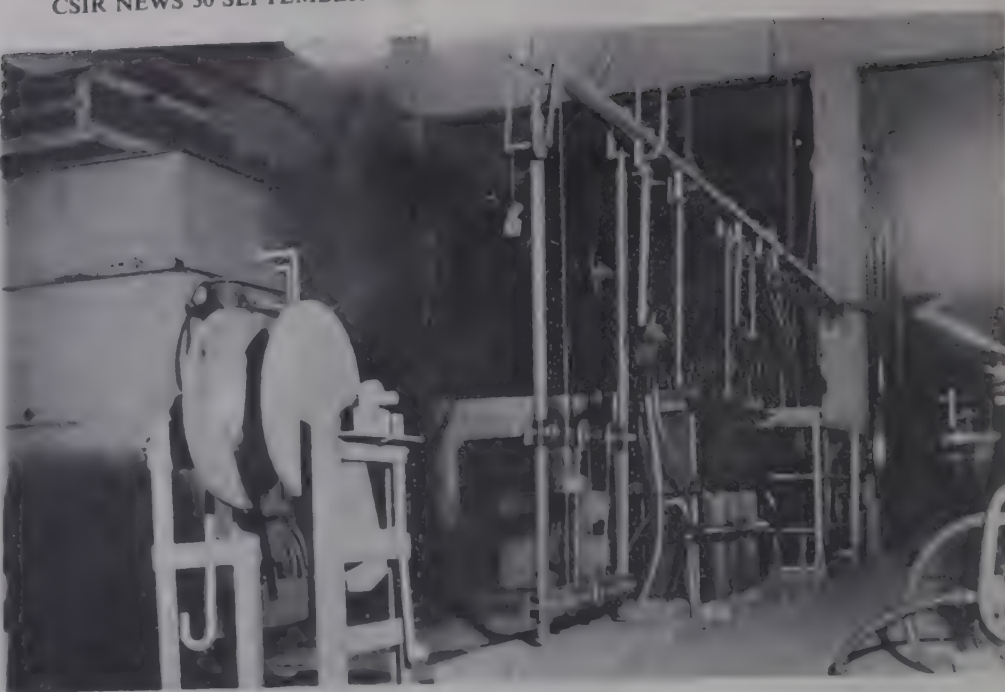
Equipment for manufacturing sand-lime/fly ash-sand-lime bricks

An equipment for manufacturing sand-lime and fly ash-sand-lime bricks has been developed by Central Building Research Institute, Roorkee. It consists of a double-shaft mixer, rotary table press, autoclave, and a boiler. Some of the major sub-assemblies, viz. a double-shaft mixer with synchronized feeding systems, motorized hydraulic pumping system with pressing and ejection jacks, a pneumatically controlled mechanism for cleaning the moulds and handling gadgets for pressed bricks, an autoclave, and a boiler, have been installed. The press, which is the main equipment in the production line, is a rotary table-type press with a hydraulic pressing system. The system is under trial runs for optimization. □

Continuous wire-plating equipment

The Central Electrochemical Research Institute (CECRI), Karaikudi, has designed and fabricated a continuous wire-plating unit for plating nickel on aluminium wires used in house wiring. In conventional wire-plating units, the failure of any one strand of wire entails the shutdown of the entire unit until the strand is restored to the normal condition, thereby affecting the production. This is obviated in this new plating unit, which is capable of plating wires of 0.3 mm to 2 mm diameter with a plating speed of 20-40 m/min. depending on the thickness of the wire and plating conditions.

The plating unit consists of a payoff system, a wire carrier, and a winding drum whose speed can be monitored at will. After the wire is fixed to the wire carrier, it is passed through various



Continuous wire-plating equipment designed and fabricated by CECRI

processing tanks meant for cleaning, etching, and plating.

The unit can be used as a multi-strand unit with individual controls in order to attend to failures in any line, the other lines not being affected. Also, there is scope for using this equipment with suitable modifications for various base metal wires with different sequences. □

CSMCRI commissions a water-softening plant at a textile mill

The Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, has designed and commissioned a water-softening plant (1000 m³ per day) in the premises of Mahalaxmi Textile Mills, Bhavnagar. The plant is based on the continuous counter-current ion-exchange technique which the institute has developed. [See CN, 30(1980), 97].

The advantages of the technique are: (i) continuous flow of soft water at reduced resin inventory, (ii) smaller equipment size and lesser space requirement, and (iii) lower regenerant and rinse water consumption. These result in lower capital investment and operating costs in comparison with

those of conventional fixed-bed ion-exchange water-softening systems, the operating cost being about 50% of the latter. □

Hops drying kiln

The Regional Research Laboratory (RRL), Jammu, has commissioned, on a turn-key basis, a hops drying kiln for J&K State Agro Industries Development Corporation. Based on a coal-firing system, the kiln's furnace can also be fired by agro- or forest wastes. The furnace has been provided with automatic temperature and air controls, which help the dry hops retain their fragrance and colour to the desired levels.

The kiln can handle four tonnes of hops per day to yield one tonne of dried and baled hops. The kiln is expected to produce 600 tonnes of dry hops worth Rs 60 lakh during the current season. □

NAL's know-how on polarographs transferred to industry

The National Aeronautical Laboratory (NAL), Bangalore, has transferred the know-how on three analytical instruments to Elico Private Limited,

Hyderabad, through National Research Development Corporation of India. The instruments are: (i) charging current compensated dc polarograph, (ii) charging current eliminated ac polarograph, and (iii) phase-selective and harmonic polarograph. The know-how transfer involved transfer of technical details and specifications of the instruments, providing technical training to the engineers of the company, and fabrication of the prototype of one of the units.

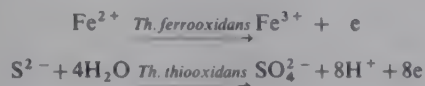
Polarographic techniques are used for the estimation of elements and organic functional groups. Conventional polarographs (ac or dc) have a disadvantage that they cannot be used for the analysis of constituents in less than 50 ppm concentration. The modified versions can be used for the analysis of constituents present at 0.01 ppm level. A special feature of the third type is that it eliminates interference in mixtures.

In general, the above polarographs can be employed for estimating concentrations in the range of 0.000001-10%. These instruments find application in the analysis of electroplating solutions, metals and alloys, geological samples, pollutants in water, etc. □

Microbial activity of iron pyrites

Iron pyrites undergo slow oxidation and this tendency persists even in the physically beneficiated concentrate. On keeping or storage, therefore, lumps of iron pyrites tend to disintegrate and crumble into powder. The cause for this disintegration has been found to be the microbial activity on the iron ore, as revealed by researches at Regional Research Laboratory, Bhubaneswar. When two samples of iron pyrites were subjected to leaching with a solution whose initial pH was adjusted to 2-3, the leach solution from the experimental sample contained substantial quantities of ferric iron with high $\text{Fe}^{3+}/\text{Fe}^{2+}$ ratios, while the control (which contained a bactericide) had very little ferric iron. Simultaneously, the sulphide

portion underwent oxidation to sulphuric acid in the experimental sample. The leach solutions were sub-cultured in a modified 9K medium with iron and sulphur energy source. Microbiological examination confirmed the presence of non-pathogenic, autotrophic microorganisms of the type (i) *Thiobacillus ferrooxidans*, microbes that oxidize ferrous iron to ferric state, and (ii) *Thiobacillus thiooxidans*, microbes that oxidize sulphide or sulphur to sulphuric acid:



Overall reaction:



The above reactions are catalyzed by the *Thiobacillus* group of microorganisms. Such microbes grow and multiply entirely in the presence of inorganic nutrients deriving their carbon from CO_2 (from atmosphere), and N, P, and other trace elements from the corresponding salts. They need oxygen for their growth (aerobic bacteria) and thrive well in an acidic environment (pH 1-3).

A scanning electron microscopic examination of microbially leached materials has shown that the pyrite mineral surfaces are intensely affected. Thus, it has been established that the naturally occurring iron pyrites have microorganisms present in the ore and under favourable conditions these start undergoing microbial degradation. Such microbial degradation is perhaps the reason why, on storage, pyrites start crumbling into powder and probably the microbes continue to survive even after physical beneficiation. While this phenomenon can be of concern to users of pyrites, the biological activity of iron pyrites can be very advantageously utilized to recover sulphur values by a simple technique. Such microbial processes take place at room temperature and can be controlled to give predetermined results if the reaction mechanisms can be understood through

extensive basic research. Conditions can also be modified by which the microbial processes can be accelerated for commercial applications.

It is also known that certain microorganisms (*Thiobacillus* type), which are likely to be present in iron pyrites, oxidize sulphides only to the elementary sulphur stage but these microbial reactions are to be brought about at neutral or at a slightly alkaline pH range. Recovery of sulphur and sulphur values through low-cost, energy-saving, and pollution-free biotechnological methods is a very potential R&D area, particularly suitable to Indian conditions. Such microbial reactions can be harnessed for recovering a variety of metals. □

Physiological changes in fishes from polluted and unpolluted environments

Animals exposed to polluted environment would predictably undergo physiological changes. A researcher, Kum. Maria Rosalia Menezes, at National Institute of Oceanography (NIO), Goa, has attempted to study alterations in the normal makeup of the electrophoretic patterns of blood serum, haemoglobin and the eye lens proteins of fishes on exposure to adverse environmental pollutants. The study was made under controlled conditions on a freshwater fish, *Tilapia mossambica* (Peters), by using mercury, in the form of mercuric chloride, as toxicant. Collateral studies included tissue uptake of the metal.

Haemoglobin patterns showed a slight increase in the faster moving band, while the patterns of eye lens protein remained quite constant throughout the exposure period. Significant changes were seen in the serum protein patterns of the fishes exposed to certain concentrations of mercury. These changes were found to affect the survival and growth potential of the fishes. Fishes exposed to low concentrations of mercury after 11 weeks' exposure showed serum protein pat-

terns very similar to the ones obtained in short-term experiments (48 hr and 72 hr) with higher concentrations of mercury in the medium which were just below the lethal level. This observation shows that a large amount of mercury taken over a short period has the same effect as smaller amounts taken over a long period have. Also, the changes in electrophoretic patterns of serum proteins could be used as a measure of sublethal toxicity of mercury and other pollutants. This technique was found to be a reliable, and rapid means of studying the impact of the entire environment on the fish as well as for supplying information on the environment itself.

The researcher has thus established that electrophoretic analysis, which provides a useful tool in biology, biochemistry and medicine, could also be used with great success as an additional tool to evaluate the environmental stress on animals.

She has also studied the morphology, electrophoresis and immunoelectrophoresis of some marine fishes to identify populations and subpopulations and to determine their taxonomic relationships.

Kum. Menezes, who carried out the studies under the guidance of Dr S.Z. Qasim, was awarded Ph.D. degree by Bombay University for her thesis based on the studies. □

Biochemical studies on hexachlorocyclohexane isomers

Hexachlorocyclohexane (HCH), a major pesticide used in India, is a mixture of several stereoisomers of which the γ -isomer is the insecticidal constituent. β -Isomer is the most persistent component of technical HCH and is known to possess high chronic toxicity to mammals.

In a study made by Shri K. Srinivasan of Central Food Technological Research Institute, Mysore, data were collected on the biochemical changes

produced by dietary β -HCH in albino rats underlying its chronic toxicity to mammals and compared with those of γ -HCH. Involvement of liver as one of the target sites of action was evidenced by abnormal serum enzyme levels and by the decrease in the cytoplasmic enzymes of liver. Evidence to the functional impairment of liver was indicated also by the serum protein profile. Hypertrophy and fatty infiltration of hepatocytes evidenced by chemical parameters were supported by histological examination of liver cells.

The influence of HCH isomers on the carbohydrate metabolism as revealed by changes in the related enzyme levels consisted of stimulation of glucose oxidative pathways and inhibition of gluconeogenesis. Increased fat synthesis and transport were evidenced by increased liver and blood lipid constituents and by radioactive tracer studies.

Dietary intake of β - and γ -HCH caused kidney tubular dysfunction as revealed by glucosuria and higher excretion of creatinine and urea while maintaining their normal blood levels. This renal damage was further confirmed by histological finding of hypertrophy and atrophy of renal tubular epithelia.

The relative abilities of β - and γ -HCH to induce mixed function oxygenase system (MFOS) with respect to dose and duration of treatment was studied by measuring the levels of structural components of endoplasmic reticulum, cytochromes and enzyme systems utilizing cytochrome P_{450} and NADPH-cytochrome reductase. γ -HCH was found to be a greater inducer of MFOS than the β -isomer. Induction of MFOS by HCH isomers was compared with phenobarbital, and evidence to point out both resemblance and difference in their mode of induction was observed. The effect of HCH-phenobarbital combined treatment and the efficiency of hematin to reverse the induction of MFOS were also studied.

A comparative distribution of β - and γ -HCH isomers in rat tissues as a function of dose and duration of treatment was studied using GLC. The two isomers exhibited different accumulation patterns in the tissues. Redistribution of HCH isomer residues stored in fat tissues following mobilization of the latter due to partial starvation was also studied.

In view of the structural similarities between HCH isomers and meso-inositol, the antagonistic relationship between the two was explored in some inositol-dependent microorganisms. Evidence in support of a possible antagonistic relationship between γ - or δ - or X_3 -isomers of HCH and inositol at low levels of the inhibitor was recorded.

Shri Srinivasan, who carried out the investigations under the guidance of Dr R. Radhakrishnamurthy of CFTRI, was awarded Ph.D. degree by University of Mysore for his thesis based on these studies. □

PROGRESS REPORTS

NGRI Annual Report: 1980-81

The annual report of National Geophysical Research Institute (NGRI), Hyderabad, for 1980-81, published recently, shows that the laboratory pursued research projects in six major areas: exploration; instrumentation; engineering geophysics and geology; magnetism & aerogeophysics; seismology and theoretical geophysics.

A number of investigations concerning the development of improved methods and techniques in exploration geophysics were completed. With UNDP assistance a very fast computer software for forward solution of the EM responses of more realistic 3-D targets were written. The programme was also successfully tested.

An experimental high-resolution reflection seismic survey of short duration was carried out near Kothagudem in the Singareni coalfield. A four-channel gamma-ray spectrometer was put into field operation for *in-*

situ analysis of uranium, thorium, and potassium contents. At the instance of Bharat Gold Mines Ltd, ore resources in the Nandidoorg mine of Kolar fields were assessed by employing geostatistical methods.

A microprocessor-based pulsed time domain EM induction prospecting device and a borehole logger for measuring spontaneous potential and resistance by employing a single electrode system were designed and developed under UNDP aid.

Geophysical and geohydrological studies were carried out in the drought-affected Anantapur district. This laboratory and Groundwater Survey & Development Agency, Maharashtra, have jointly selected two sub-basins (Godavari-Purna and Kukadi) of Aurangabad and Ahmednagar districts of Maharashtra for integrated geohydrological and geophysical studies. Aquifer modelling of Ghazipur district (Uttar Pradesh), covering 960 square miles, has been started. Tritium and radiocarbon studies were carried out on water samples to understand the age and movement of groundwater.

In the Indo-German collaboration project the first phase of the hydraulic fracturing experiment in deep mines of Kolar Gold Fields were carried out.

Integrated geological, geochemical and geophysical investigations of some of the typical precambrian greenstone/ adjoining gneissic-granitic granulitic terrains in the southern part of the Peninsular Shield were carried out under a PL-480 scheme in collaboration with some scientists from USA. Facilities for simultaneous sodium and potassium analyses on rocks and minerals by flame-photometry have been set up.

In a survey project sponsored by Geological Survey of India (GSI), 10,000 line km of airborne geophysical surveys, by employing magnetic and scintillometric methods, were carried out over the Cuddapah basin. Gravity studies on the basin were carried out with a view to understanding the

structure, tectonics and mineralization of this basin. Data from the geomagnetic, geoelectric and equatorial geomagnetic/geoelectric observatories of the institute were regularly recorded and exchanged with those of data centres elsewhere in the world.

Total intensity aeromagnetic maps of three blocks of Narmada-Son lineament were completed on the basis of surveys completed earlier. The analog part of a magnetotelluric equipment was designed and developed.

Field work was completed for deep seismic sounding along Ujjain-Nepanagar-Mahan profiles (1300 line km) across the Narmada-Son lineament under the CRUMASONATA programme sponsored by GSI. As part of the same programme DSS studies were also carried out along a 80-km-long profile from Popatheda to Patur in Maharashtra.

Seismic surveillance in north-east India was continued. A preliminary examination of seismic data accruing from seismic stations installed, in collaboration with RRL-Jorhat at Jorhat (Assam), Yaongyimsen and Kohima (Nagaland) and Khonsa (Arunachal Pradesh) reveal that earthquake detection and location capabilities have considerably improved in this region. The Hyderabad seismological observatory was successfully operated and data were recorded and exchanged with those of data centres elsewhere in the world.

Extensive studies in theoretical geophysics carried out relate to tectonophysics and the modelling of internal structure of the earth and other near-surface geological formations. The studies have led to interesting results.

A PW 1300 X-ray fluorescence spectrometer procured from N.V. Philips, Holland, was installed. Two giant drilling rigs capable of drilling telescopically down to 1000 m were gifted to the laboratory by the Federal Republic of Germany under a bilateral scientific collaboration programme for

development of groundwater resources in the country.

The institute published 75 research papers and prepared 20 technical reports during the year under report. Two scientists, Dr K.L. Kaila and Dr J.G. Negi, were awarded S.S. Bhatnagar Prizes for 1979 and 1980. Another scientist, Dr S.K. Verma, received the Krishnan Medal, instituted by IGU, for 1980. □

CMERI Annual Report: 1979-80

The annual report of Central Mechanical Engineering Research Institute (CMERI), Durgapur, for 1979-80 reveals that the institute and its constituent MERADO centres worked on 25 products and processes which were licensed to industries for commercial production, and that 19 products went into production for the first time. The research programmes of the institute and its extension centres included 35 sponsored and five collaborative projects. Besides, 17 technical consultancies were offered and developmental testing facilities were extended to a large number of industries both in the public sector and in the private sector.

The development of steam jet ejectors for public-sector industries was an important piece of work in applied mechanics. Of the two phases in which the study was made, the first was concerned with single-stage, non-condensing type of ejector, while in second phase, the performance of a multi-stage condensing system was investigated. Data generated were being utilized for designing systems in petrochemical industries.

The institute studied vibration problems of turborotors in various power plants. For a refrigerator manufacturing unit in the public sector, noise and vibration problems of domestic refrigerators were studied and suggestions for improvement were offered. A prototype of a turbo-expander for low-temperature applications was developed. For private industries,

mechanical load brakes, spin-ring attachment for milk cans, 25-tonne hydraulic jack, drill head for radial drilling machine, tractor implement for harvesting sugarcane, stone crusher and various toolings for 7.5 BHP motor, diving suit, etc. were developed and released to industry.

Work on the development of a crystal ice maker was continued. The second prototype has a production capacity of about 100 kg per day. It is a continuous production machine and gives crushed ice ideally suited to fruit juice vendors and fish sellers.

A continuous feed-type working plant for generating combustible gases from water hyacinth was installed. The designed capacity of the plant is about 3000 litres of gas per day. With an initial charge of about 18 cwt of coarsely chopped semi-dried water hyacinth, the plant is required to be fed with about 40 kg raw material daily after the 20th day of the initial charge to maintain the 3000 litres per day output in summer days. The calorific value of the gas is 4895-5162 kcal/m³.

A self-propelled paddy harvesting machine run by a small diesel or petrol engine has been designed. Also the design of the pedal pump was licensed to 12 industries, of which four had already started marketing their products. Mechanical load brakes were designed for 200-tonne main hoist and 50-tonne auxiliary hoist of an overhead travelling crane manufactured indigenously.

A 25-tonne hydraulic jack of integral type, in which the lifting jack and pump unit are integral, was designed. A lens-centring and edge-grinding machine was designed to cylindrically grind the edges of optical lenses, convex and concave, parallel to their optical axes. Lenses can be ground in the range of 5 to 100 mm dia. with this semi-automatic machine.

A technique of electrochemical deburring using graphite balls in an electrolyte bath was developed. This is the most advanced and sophisticated method of conforming electrode electrochemical deburring.

Some of the important pieces of design and development work undertaken successfully by MERADO centres relate to: (i) a consumable nozzle electroslog welding machine; (ii) drill head of a radial drilling machine of drilling capacity 50 mm in steel; (iii) combine harvester; (iv) a single-spindle automatic machine; (v) improvement of a Muller mixer used for making a fine powder of explosive gun powder; and (vi) a stone crusher capable of crushing stones of 10-250 mm size with a capacity of 11 tonnes/hr. □

CONFERENCE BRIEFS

Fifth International Congress of Plant Tissue and Cell Culture

Dr A.F. Mascarenhas of National Chemical Laboratory, Pune, and Dr H.C. Chaturvedi of National Botanical Research Institute, Lucknow, participated in the title congress held in Tokyo, 11-16 July 1982. The two CSIR scientists were members of the Department of Science and Technology's delegation. Dr Mascarenhas' report:

More than 650 delegates, including 20 from India, representing nearly 50 countries participated in the congress. The scientific sessions started with special lectures by four distinguished tissue culture scientists. This session was opened by Prof. R.J. Gautheret, one of the discoverers of plant tissue culture, who traced the history of plant tissue culture to its present state. Prof. G. Melchers reviewed the first decennium of somatic hybridization by fusion of protoplasts. Prof. Chue-Pui Ho, Vice President of the Academia Sinica, China, covered in detail, the work carried out the world over on clonal propagation and isolation of mutants and haploids, highlighting the advances made in China. Current work on production of useful compounds by plant tissue culture was reviewed by Dr E.J. Staba.

The oral and poster presentations consisted of 161 papers and 253 poster demonstrations.

The sessions on secondary products, biosynthesis, biotransformation and regulation of secondary metabolism revealed a new trend by the immobilization of plant cells entrapped in alginate where an increased synthesis of alkaloids was demonstrated.

The session on micropropagation was subdivided into two, one dealing with forest trees and the other with herbaceous plants. The importance of these sessions could be seen from the profusion of papers covering a cross-section of trees and plants belonging to different families, genera and species. Presentations revealed the success achieved with micropropagation of mature forest trees, and with mass production of pines from seedling tissues; with the development of procedures for producing healthy seed for supply to potato farmers, and for large-scale production of several ornamentals, and medicinal and flowering plants.

In the areas of isolation, fusion, somatic hybridization and gene transfer by the use of protoplasts there were many reports on the use of new fusion agents. One which holds out promise was through an electrical impulse. In addition, new interspecific somatic hybrids were also reported between different species of *Brassica*, *Solanum*, etc. There were also several papers on the regeneration of protoplasts from leguminous plants.

Also presented at the congress were several interesting papers on regulation of growth, carbon and nitrogen metabolism; on somatic embryogenesis, the work on bamboo, coffee, etc. deserving special mention; on physiology and biochemistry of tissue cultures, shedding light on morphogenesis; on genetic variability, chromosome instability, cryopreservation of germ plasm, androgenesis, etc.

The NCL's paper, titled 'Rapid clonal multiplication of mature forest trees through tissue culture', described the conditions for obtaining high rates of multiplication by tissue culture from

mature, elite trees belonging to three species of *Eucalyptus*, viz. *E. citriodora*, *E. terreticornis*, *E. globulus* and of rosewood and rubber. These are among the first reports on the rapid multiplication of mature, identified forest trees with possible application in forestry. Field data on the growth of these tissue culture plants were also presented.

International Conference on Precision Electromagnetic Measurements

Dr S.L. Dahake of the Division of Standards of National Physical Laboratory, New Delhi, attended the International Conference on Precision Electromagnetic Measurements held at Boulder, Colorado, USA, 28 June-1 July 1982. Dr Dahake presented a paper on 'Progress in the realization of the units of capacitance, inductance and resistance at NPL, New Delhi, which shows that NPL-India is on par with major standards laboratories in the world. Dr Dahake's report on the conference:

Automation in metrology is going to play an increasingly important role for increasing the accuracy and precision of measurements by utilizing newer methods which cannot be used manually. A new definition of the metre in terms of the second was proposed, viz. that the metre is the distance travelled by light in vacuum during a fraction $1/299,792,458$ of a second. With this definition the metre can be realized from the wavelength of any stabilized laser. A new definition of the ampere based on ac-Josephson and quantized Hall effects was proposed, by which the ampere could be realized with a much higher accuracy, viz. $1A = ev_0$ where the frequency v_0 becomes $1/e$ and only the electron charge e need be defined. Results of time synchronization within a large geographical area via satellite by transmitting synchronization pulses with accuracies of a few nanoseconds were reported. An automated high-accuracy phase measurement system to

measure time differences between pairs of atomic clocks required for time-keeping and making the most accurate frequency measurements was reported. Absolute frequency measurements with increased accuracy and reliability in the far- and near-infrared to act as new references for visible frequency standards were also reported. Important results in cryo-electronics included the development of microwave squid for the measurement of RF attenuation and high-precision Josephson potentiometer with an extremely small uncertainty of 10^{-9} level.

The need for more precise optical measurements, especially in radiometry, was highlighted.

Dr Dahake also visited the laboratories of National Bureau of Standards at Boulder and at Washington, DC, to acquaint himself with the latest developments in the field. □

DEPUTATION BRIEFS

Dr R.K. Bhandari

On invitation from Unesco, Dr R.K. Bhandari of Central Building Research Institute, Roorkee, participated in the meeting of the International Scientific Council (ISC) and of the working group on Earth Sciences held in Prague, Czechoslovakia, 2-8 May 1982.

Sixteen experts from eight countries participated in the meeting, which was organized jointly by the Unesco's Divisions of Water Sciences and Earth Sciences, to work out a plan for 1984-89, reports Dr Bhandari, who was largely instrumental in having the topic of swelling soils (of great relevance to India) included in the Unesco programme.

In June Dr Bhandari attended, as a member of the Indian delegation to The Hague, the first meeting of the International Standards Organisation (ISO) on Geotechnics. The base paper prepared by him (and Shri G. Raman of Indian Standards Institution) provided the framework for discussion. The CSIR scientist reports that the committee resolved that in view of the

considerable work done by India, particularly in the standardization of field and laboratory investigations and monitoring, it would be appropriate if she could agree to accept the secretariat of this subcommittee.

The CBRI scientist also visited UK from 19 to 26 June in connection with the CSIR-Building Research Establishment (BRE) collaborative project in foundation engineering. The project envisages, *inter alia*, intensive studies on instrumented multi-bulb piles to unfold their load transfer mechanism. The details of the experiments on instrumented multi-bulb piles were drawn up during the visit, and the test results of experiments on instrumented piles already conducted at CBRI were discussed. The BRE scientists are expected to launch field experiments, later this year, jointly with CBRI at a site in the campus of Shri Govind Ram Saksaria Institute of Technology and Science, Indore, reports Dr Bhandari. □

PERSONNEL NEWS

Dr V.V.R. Varadachari appointed NIO's Director

Dr V.V.R. Varadachari, who has been heading National Institute of Oceanography, Dona Paula, Goa, as Acting Director since 14 May 1981, has been appointed Director of this institute (19 July 1982).



For details of Dr Varadachari's scientific career and work see CN 31(1981), 95; 30(1980), 167. □

Prof. Y. Nayudamma

Prof. Y. Nayudamma, former Director General of CSIR and presently Vice

Chancellor of Jawaharlal Nehru University, will continue as Distinguished Scientist at the Centre for Developmental Alternatives, Central Leather Research Institute, Madras, for a further period of two years from 1 October 1982. □

Appointments/Promotions

Shri M.C. Ragavan

Shri M.C. Ragavan of Central Road Research Institute (CRRI), New Delhi, has been promoted on assessment as Documentation Officer EI (1 June 1981).

Shri Ragavan (born 11 Aug. 1931) obtained his B.Sc. from Delhi University in 1951, postgraduate diploma in archival science in 1952, and A.D.R.T.C. with distinction in 1964. With CRRI since 1952, Shri Ragavan has been responsible for organizing the institute's library. He initiated the first abstracting service in road research, 'CRRI Road Abstracts', in 1962.

He visited UK under the CSIR-British Council Exchange Programme in 1978, which resulted in the CRRI-TRRL-IRRD collaborative programme of access to the IRRD data base.

A specialist in depth classification and user education, he is engaged in preparing learning packages for user education and the training of highway engineers. He has also started a highway engineering data bank and information analysis centre at CRRI.

He has some 20 papers to his credit, besides a draft plan for establishing a national road information centre, as a sectoral centre on roads under the NISSAT plan.

* * *

Shri Gyan Prakash

Shri Gyan Prakash of Central Road Research Institute (CRRI), New Delhi, has been promoted on assessment as Scientist EI (1 April 1981).

Shri Gyan Prakash, M.A., B.Sc., has more than three decades' experience in highway engineering research, and dissemination of scientific information.

His pioneering work on the development of the road system in India through ages led to the publication, by the institute, of 'History of Road Development in India'. Shri Prakash was associated with CRRI's research team to explore the possibilities and conduct studies on the application of operational research techniques in highway engineering research and constructions. □

Retirements

Dr P.R. Rao

Dr P.R. Rao, Scientist F and chairman of the Organic Chemistry Division of Regional Research Laboratory (RRL), Jammu, retired on 31 July 1982.

An M.Sc. and D.Sc. of Andhra University, Dr Rao (born 1 Aug. 1922, at Eluru, Andhra Pradesh) has had a distinguished academic record. With CSIR since 1961, first at RRL-Jorhat, and later at the Jammu laboratory, he had earlier worked at Andhra University and Forest Research Institute, Dehra Dun.

A specialist in natural products chemistry, Dr Rao has over 100 publications to his credit and is one of the authors of 'Advancing frontiers in the chemistry of natural products'. To the credit of Dr Rao and his team stand a large number of processes in organic synthesis, which have found commercial application. These relate to menthol (bolder) crystals, xanthotoxin and trimethylpsoralen, total alkaloids of belladonna, hyoscyne hydrobromide, atropine, colchicine, progesterone, berberin hydrochloride, ajmalicin, pangamic acid (vitamin B₁₅), etc.

Dr Rao has served as an expert in phytochemistry at University of Havana (Cuba), and, as a UNIDO expert, he has put the essential oil industry in Burma on a sound footing. □

CSIR Headquarters' posts redesignated

The following posts at CSIR Headquarters, New Delhi, have been redesignated:

Chief (Administration) as Joint Secretary (Administration); Chief (Finance) as Internal Financial Adviser (IFA); Deputy Chief (Finance) as Deputy IFA; Scientist F as Joint Adviser; and Scientist EI/EII as Deputy Adviser. There is no change in the powers and functions attached to the posts. □

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Advertisement No. 47/82

The Council proposes to appoint Director for Central Scientific Instruments Organisation, Chandigarh, which is devoted to the design, development, and indigenous manufacture of scientific instruments.

The main activities of the organization at present are concerned with (1) development of optical, electro-optical, electronic, electrical, electro-mechanical, and medical instruments; (2) repair and maintenance of scientific instruments; (3) testing and calibration of electronic, electrical, optical, and mechanical instruments; (4) technical assistance to industry, defence, educational institutions, and various government departments; and (5) training of precision instrument mechanics.

Qualification: Candidates should have high academic qualifications and outstanding attainments in a field of physical sciences/engineering/technology and should have adequate experience in organizing and guiding research and development projects in instrumentation, qualities of leadership, and managerial and administrative experience.

Job Requirements: To head CSIO and to plan, guide and conduct research and development programmes and other activities of the organization.

The scale of pay attached to the post is Rs 2500-125/2-3000 plus allowances as per Central Government rules. Higher initial pay can also be considered. Consultancy earning subject to an upper limit of Rs 15,000 per year is permitted. Free medical aid and leave travel concession are also permissible for the family. Residential accommodation in the campus is available on payment of rent.

Age: Should be preferably below 50 years, relaxable in deserving cases.

This is a contractual appointment initially for a period of six years and is extendable. The incumbent can also be confirmed.

Those interested may kindly send their curriculum vitae in the prescribed form, obtainable free from office of CSIR, and send the completed form to the Joint Secretary (Administration) CSIR, Rafi Marg, New Delhi 110001 on or before 1 November 1982. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

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Metrology for South and Central Asia

The immediate metrological needs of the countries in the south and central Asian region were not only identified but an action plan was worked out to provide immediate support to augment facilities for legal metrology, industrial metrology, calibration of measuring equipment, testing of industrial products, etc. at a regional working group meeting held at National Physical Laboratory (NPL), New Delhi, from 9 to 11 August 1982. Organized under the joint auspices of Unesco and NPL, the meeting came out with a nine-point recommendation and action plan as a result of deliberations spanning five technical sessions.

This meeting was a sequel to the fourth meeting of the steering committee of the Asia Pacific Metrology Programme (APMP) (Jakarta, 1981) and the earlier Unesco regional seminar on Metrology and Legal Metrology (Sri Lanka, 1978), and formed part of the Unesco programme for promotion of regional cooperation and establishment of national research and training infrastructure in applied sciences.

The working group meeting was inaugurated by Prof. S. Nurul Hasan, CSIR's Vice President, who in his address underlined the cardinal importance of the science of measurement not only to the enterprise of science itself but

to the industrial self-reliance of a nation. The Vice President also stressed the importance of cooperative endeavour in spreading the science of measurement. In this, he observed, 'we are spreading the possibilities of economic cooperation and collaboration and therefore standing on our own feet and serving our own people'. The people in this region, he emphasized, need the highest quality of service from every section of society, particularly scientists, technologists, and engineers.

Dr A.P. Mitra, NPL's Director, in his welcome address, mentioned that metrology and standardization are vital for the economic and industrial development of a country because quality of products is ultimately assured by using test and measuring instruments which have guaranteed accuracies through periodic calibration. Thus a well-coordinated national system on metrology and standardization was the first step towards quality assurance. It was also essential in international trade that industrial products manufactured in one country meet the specifications asked for by the other country, he added. Thus a well-coordinated international system of metrology and standardization was equally important.



Dr A.P. Mitra, NPL's Director, delivering the welcome address at the Regional Working Group Meeting on Metrology for South and Central Asia. Seated on the dais are (from left): Prof. S. Nurul Hasan, Vice President, CSIR; Dr M.P. Borkachy, Unesco representative; and Dr Kailash Chandra, Scientist, NPL

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4 NOV 1982
C.F.T.R.I., MYSORE

To promote collaboration and cooperation in metrology amongst the countries of the Asia Pacific region, several international agencies such as Commonwealth Science Council (CSC), Unesco, Association for Science Cooperation in Asia (ASCA), and Australian Development Assistance Bureau had joined hands in promoting a cooperative programme, which is now called 'Asia Pacific Metrology Programme'. This programme started in November 1977, and today 17 countries, namely Australia, Bangladesh, China, Hong Kong, Japan, India, Indonesia, Malaysia, Mauritius, New Zealand, Pakistan, Papua New Guinea, Philippines, Republic of Korea, Singapore, Sri Lanka, and Thailand were members of this programme, he added. He also referred to the many collaborative activities in progress under this programme.

Speaking on behalf of Unesco, Dr M.P. Derkatch, briefly outlined the programmes which Unesco has been supporting in the field of applied engineering sciences in general and metrology in particular. He stressed the need for developing regional cooperative programmes in various fields, specially in metrology, and emphasized that countries of the region should assist each other in establishing and augmenting facilities in legal, industrial and scientific metrology in the region.

Participants, drawn from Afghanistan, India, Maldives, Nepal, Pakistan and Sri Lanka, who presented their country reports, identified their respective country's requirements for the next two years in relation to length, mass, volume, temperature and electrical (dc and power frequency) measurements and recommended that these be met through national resources or through international aid.

The next item on the agenda was the identification of training requirements in metrology, standardization and quality control. Gratifyingly, such facilities were found already available in the region, India taking the pride of

place in this respect. India has facilities for training in legal metrology at Indian Institute of Legal Metrology (Ranchi); in scientific and industrial metrology at NPL (New Delhi) and Central Machine Tools Institute (Bangalore), and in standardization and quality control at Indian Standards Institution (New Delhi), National Test House (Calcutta) and regional and state laboratories under the Department of Electronics'. Standardization, Testing and Quality Control Programme. Other countries in the region which have facilities in part are Sri Lanka and Pakistan.

Having identified the requirements for periodic calibration of national measurement standards and precision measurement standards, the working group recommended, among others, that calibration should be undertaken as far as possible by measurement laboratories in the region, by consulting the ASCA/CSC Directory of National Measurement Systems (Korean Standards and Research Institute, 1981).

Laying down guidelines and norms for intercomparison of measurement standards through travelling standards, the working group called upon participant countries to follow the procedure for intercomparison as adopted under APMP and recommended familiarization visits of scientists to laboratories in the region.

Through another of the recommendations the working group called for taking up a feasibility study on the development of certain measurement standards and instruments.

With regard to repair and maintenance of precision measuring instruments, an important recommendation was that a directory of repair and maintenance facilities available in the region be prepared by a study group comprising representatives from India's Department of Science and Technology, NPL and Central Scientific Instruments Organisation, and Pakistan's National Physical and Standards Laboratory.

Three more recommendations were concerned, one each, with (i) information system on metrology, (ii) consultancy and advisory services, and (iii) creating awareness in this field. Recognizing the need to establish a well-organized information system on metrology in the region, the working group recommended that Unesco ROSTSCA Bulletin published by Unesco Office at New Delhi be used for dissemination of information on metrology; it also called for the issuing of a newsletter on measurements for the region. Compilation of a panel of consultants from each country by Unesco, holding of seminars in each country on metrology and standardization, and production of video cassettes and audio-visual programmes on this subject were among the other recommendations.

An *ad-hoc* group comprising representatives from three participant countries—Sri Lanka (Shri H.L.K. Goonetilleke), Pakistan (Dr S.S.H. Zaidi) and India (Dr Kailash Chandra, NPL)—was constituted for preparing a project document on the deliberations and outcome of the meeting to be submitted to UN agencies. □

Camphor by electrolytic oxidation of isoborneol

A process for the electrochemical oxidation of isoborneol to camphor, which has some advantages over the conventional process, has been developed by Central Electrochemical Research Institute, Karaikudi, in a project sponsored by a chemical industry. Oxidation is carried out with hexavalent chromium. The trivalent chromium, obtained during the oxidation of isoborneol, is re-oxidized to hexavalent state in an electrolytic cell. Conditions have been standardized for the regeneration of hexavalent chromium as well as for the oxidation of isoborneol. The process, studied on 1 kg per batch scale, was demonstrated to the sponsor Venkateswara Chemicals, Karur.

Camphor is widely used for the manufacture of celluloid and as a repellent for ants, flies, moths, and other insects. The demand for camphor in the country is of the order of 1500 tonnes per year. The product obtained by the electrochemical route is of high purity and can be used directly for pharmaceuticals preparation. Highly suitable for the small-scale sector with low capital investment, the process is pollution-free. □

Portable precession magnetometer

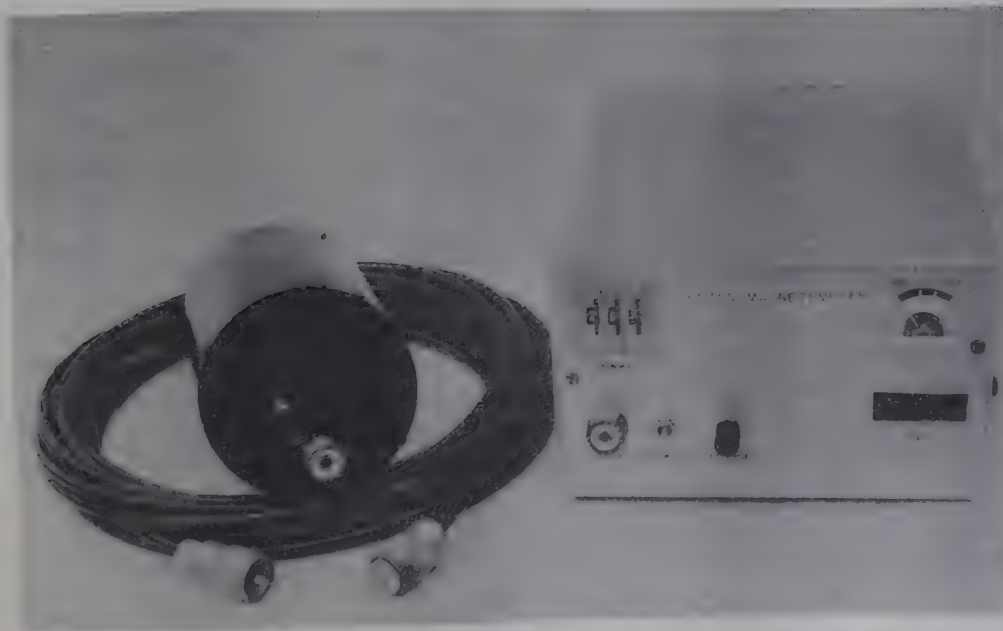
Prototypes of a new portable proton precession magnetometer for mineral exploration work have been designed and fabricated by National Geophysical Research Institute (NGRI), Hyderabad. The instrument is designed to measure the total intensity of magnetic field over the range of 20,000-70,000 gammas, with a sensitivity of 1 gamma, through the measurement of the frequency of precession of protons in the magnetic field under measurement.

The institute has been engaged over a number of years in the development of proton precession magnetometers for

geophysical exploration and has made such magnetometers for ground, ship-borne and airborne operations. These magnetometers use a novel technique for signal generation, also developed at NGRI.

The speciality about this magnetometer is in its compactness, small weight and low power consumption. The instrument alone weighs only 1.25 kg. Its power drain has been drastically reduced to a standby value of 15 mA as against 1250 mA drawn by its earlier versions. The new signal generation technique has done away with a mechanical relay that is essential and inescapable if the signal generation is done in the conventional manner. No other design currently available the world over has succeeded in avoiding a mechanical relay.

The entire circuit is wired on a single printed board (21 × 16 cm). The board and the batteries are housed in an aluminium casing measuring only 23 × 17 × 9.8 cm. The entire measurement process is reduced to a single button pressing, which causes a digital display of the magnetic field at the sensor location. □



Proton precession magnetometer designed and fabricated by NGRI. Designed for mineral exploration work, the device can measure total magnetic field intensity in the range of 20,000-70,000 gammas with a sensitivity of 1 gamma. It weighs only 1.25 kg and has a low power consumption

Heavy metals toxicity and monitoring

Heavy metals, unlike most other pollutants, occur naturally and are also added to the environment by man's activities. They have attracted much attention because they are non-degradable, persist in nature for extended periods of time, are toxic to living organisms even at fairly low concentrations, and tend either to biologically magnify or accumulate in plant and animal systems.

The adverse effects of heavy metals on biological and environmental systems have necessitated the development of analytical methods which should be accurate, precise, rapid, selective, and sensitive. Methods which are suitable for the estimation of heavy metals in the environment under Indian conditions are now available as a result of extensive studies made by Shri Mohammad Zubair Hasan of the Water Division of National Environmental Engineering Research Institute, Nagpur.

A comparative study of the methods of determination of arsenic, cadmium, copper, lead, manganese and zinc in aquatic and biological systems revealed that the silver diethyl dithiocarbamate spectrophotometric method for arsenic, and atomic absorption spectrophotometric methods using ammonium pyrrolidine dithiocarbamate-methyl isobutyl ketone for cadmium, copper, lead and zinc are most suitable. Various chelating agents and solvents for concentrating manganese and subsequently determining it by atomic absorption spectrophotometry have been studied. Sodium diethyl dithiocarbamate was found to form a stable complex with manganese. Extraction of the complex with ethyl acetate resulted in more accurate and sensitive results.

A method for determining internally incorporated lead in hair was developed. In this, externally adsorbed lead is removed by washing the hair with triton Y-100 and 20% hydrochloric acid. The washed hair is wet-digested and

lead is determined by atomic absorption spectrophotometry. The method holds good for cadmium, copper, and zinc.

The heavy metal levels in water are directly related to industrial pollution and the bottom sediments are valuable indicators of the prevalence and dispersal pattern of heavy metals. Heavy metals monitored in river, surface, underground and municipal supply waters showed that they were present below their permissive levels.

Monitoring of heavy metals in cereals, vegetables, fish and soils of an industrialized city was also carried out. The results, compared with those of a comparatively non-industrialized city, showed that the levels of arsenic, chromium, lead, manganese and mercury were higher in the industrialized city. Surveys for heavy metal levels in tea, colours, paints, pigments, and feed were also conducted.

Levels of arsenic, cadmium, copper, lead, manganese, mercury, and zinc were monitored in the blood and hair of normal urban and rural populations, battery repair workers, and goldsmiths. Higher levels of cadmium, lead, and mercury in both blood and hair were found in urban populations. Lead and cadmium levels were higher among battery repair workers and goldsmiths.

Laboratory experiments on metal interactions showed that metals produce both antagonistic and synergistic effects depending on their doses. Laboratory animals exposed to pesticides and other chemicals showed an imbalance of heavy metals in the body system. In general, exposure resulted in migration of heavy metals from organs towards circulatory systems.

Shri Hasan, who worked under the guidance of Prof. S.H. Zaidi, was awarded Ph.D. degree in chemistry by Kanpur University for his thesis based on the study. □

PROGRESS REPORTS

IIP Annual Report: 1981

On the basis of extensive laboratory and bench-scale studies which it carried out

in collaboration with Engineers India Ltd (EIL), Indian Institute of Petroleum (IIP), Dehra Dun, offered a complete process for the new aromatics extraction unit of Bharat Petroleum Corporation Ltd. The unit will have a capacity of 1,06,000 tonnes of benzene and toluene per annum. This is one of the important pieces of work as revealed in the annual report of IIP for 1981, published recently. Another significant achievement in process development, according to the report, is the commissioning, also in collaboration with EIL, of a new solvent dewaxing and deoiling pilot plant at the institute. The plant has been running on Barauni and Madras slack waxes with methyl isobutyl ketone as the deoiling solvent. The Barauni slack showed very high filtration rates and deoiled wax yields as compared to Madras Refineries slacks. The oil content and melting point requirements in respect of paraffin wax were in accord with IS specifications. However, a finishing treatment would be necessary for improving the colour and colour stability of the deoiled wax.

A process was developed successfully for polymethyl methacrylate (PMMA) by using the suspension polymerization technique. The samples of PMMA produced were comparable in performance with commercial products.

Combustion studies on 2-stroke scooter engines were taken up with a view to improving fuel economy. Experimental data on engine performance and exhaust gas composition were collected with two inlet systems: (i) air-flow measurement system, and (ii) standard air-filter assembly. The study on the effect of inlet restriction on engine performance and mixture strength showed a good correlation between inlet restriction and engine performance.

An 'urban driving cycle' based on the traffic pattern in Delhi was developed for exhaust emission and fuel economy studies. Studies with the device showed that passenger cars emitted about 541, 87 and 84 kg per annum per vehicle of

carbon monoxide, hydrocarbons, and oxides of nitrogen respectively. To develop a national driving cycle, traffic pattern surveys in other cities were being made.

The institute continued its efforts for finding substitutes for diesel/petrol. The wear tests on a 4-stroke automotive engine with methanol-gasoline blends showed that the use of alcohol-blended fuels in comparison with pure gasoline increases wear, especially at low operating temperatures.

Feasibility studies on making bright stocks and cylinder oils from Arabian crude mix were completed for Hindustan Petroleum Corporation Ltd. Operating parameters included de-asphalting, solvent extraction, dewaxing, and hydrofinishing. A one-litre sample of the final product along with the feasibility report was sent to the concerned industry.

Feasibility studies on the production of aluminium-grade petroleum coke from Bombay High crude oil were completed for the Ministry of Petroleum, Chemicals and Fertilizers.

The project on clay-based greases was completed and the development work on aluminium complex greases was nearing completion. The study relating to clay-based greases covered characterization of Indian bentonites, homoionization of montmorillonites containing bivalent exchangeable cations, oleophilization of homoionized bentonites, processing and formation of greases and physico-chemical characteristics and performance evaluation of the greases developed.

The high-efficiency wick stove developed by the institute was licensed to five more parties through National Small Industries Corporation Ltd; marketing of the stove is being done by Indian Oil Corporation Ltd. The low air-pressure burner completed a further series of successful trials at four different industrial furnaces and was ready for being licensed for manufacture.

A prototype *chullah* incorporating the salient features of the designs of both IIP and Central Mine Planning and Design Institute (CMPDI) and another improved direct coal-fired *chullah*, in which coal and not coke burns as the main fuel, were fabricated and sent to CMPDI, Ranchi.

A survey for developing norms of consumption of petroleum products for automobiles was completed.

The institute completed investigations on as many as 34 projects. Forty-six papers were published; two patents were accepted, and three patents sealed.

* * *

IICB Annual Report: 1980-81

The annual report of Indian Institute of Chemical Biology (IICB), Calcutta, for 1980-81 shows that the institute had on hand 58 R&D projects. The highest number of projects (22) was in experimental medicine, 13 projects were related to biochemical engineering, and 10 each were in (i) medicinal chemistry and (ii) emerging areas in biological research such as structure and function of membranes, immunobiology and genetic recombinants.

The institute entered into collaboration with a pharmaceutical company for developing pyrogen test kits. The determination of circulating myoglobin as an index of myocardial damage, of estriol as an index of foetal health, and of pyrogen for testing the fever-producing nature of test specimens is of great importance to health-care programmes. The techniques in vogue for the diagnosis of pathological conditions by the use of radioimmunoassays are expensive, require sophisticated equipment and are, therefore, not suitable under rural conditions. However, diagnostic methods employing enzyme-linked immunosorbent assays and enzyme-mediated immunoassays could overcome these problems and their widespread application is visualized through the development of easy-to-handle and

cheap diagnostic kits for the determination of myoglobin and estriol in body fluid and of pyrogen in biological and pharmaceutical samples.

Under its programme on search for new antifertility compounds, the institute continued its studies on comprehensive toxicity evaluation of aristolic acid, which had already shown encouraging results as an antifertility agent. Experimental cultivation of the weed *Kallstroemia pubescens*, a source of diosgenin, yielded results comparable to agro-economics of other diosgenin-containing plants.

Attempts were being made to develop methods of diagnosis of inborn errors of metabolism leading to mental abnormality. A number of cases of mucopolysaccharidosis and phenylketonuria were identified by using the technique of differential diagnosis based on enzyme deficiency studies. Investigations on the molecular biology of *Vibrio cholerae* revealed that it lacked excision repair mechanism. The studies were being pursued so as to facilitate the development of efficient methods of cholera control.

Glycosidic liposomes were being developed under a project on specific targeting of drugs. The technique involves suitably tailoring liposomes containing the drugs so that the system is capable of binding specifically to the desired site of action for releasing the drugs. Experiments with liver showed that the hepatocytes preferentially attract β -galactosidic liposomes, while nonparenchymal cells exclusively bind α -mannosidic liposomes. The suitability of the technique, employing models of experimentally induced hepatitis, had already been demonstrated for specifically targeting drugs to hepatic cells. Owing to cell-specific targeting, the untoward side effects of drugs are minimized. Work on production of carbohydrases from mushroom culture was continued. A mannanase was identified and an inulinase obtained in high yields from the extracellular broth during the culture of some mushrooms.

The latter is of interest because of its potential use for the production of fructose from inulin-rich plant roots.

The development of processes for preparing high-value products of diagnostic, therapeutic and research interest from low-value raw materials like agricultural residues, cheap marine resources, and hospital and abattoir wastes was another area of great thrust. Studies were being made on processes for the isolation of (i) expensive carbohydrate-binding lectins from agricultural residues and cheap marine resources such as the Indian horse-shoe crab; (ii) human chorionic gonadotropin (HCG) from the urine of pregnant women; and (iii) glucagon from animal pancreas. The importance of the products centres on some specific applications—HCG is used therapeutically for cryptorchism, hypogonadism and uterine bleeding of functional nature and diagnostically for pregnancy; lectins are used for blood typing and cell surface studies; and glucagon is used therapeutically as a hyperglycaemic-glycogenolytic factor.

Seventy-nine papers were published, and 47 presented in symposia/conferences. □

EXTRAMURAL RESEARCH

Biochemistry of goat milk

The two components of lactose synthetase, namely α -lactalbumin and galactosyl transferase, have been isolated from goat milk, purified and characterized by a CSIR research fellow. The researcher, Hakimuddin Taher Ali Sojar, made the study at Ahmednagar College of University of Poona.

The enzyme galactosyl transferase was isolated and purified to homogeneity for the first time. Purification was achieved in four steps: removal of caseins by isoelectric precipitation, fractional precipitation with ammonium sulphate, hydrophobic chromatography, and affinity chromatography.

To purify alpha-lactalbumin (α -LA) from goat milk, two methods were developed. In the first method, molecular sieving on Sephadex G-75 was followed by ion-exchange chromatography on DEAE-cellulose column. In the second, galactosyl transferase and α -LA could be isolated concurrently by fractional precipitation, this method offering better yields than the first.

Goat milk galactosyl transferase was found to be heterogeneous on SDS-polyacrylamide gel electrophoresis (mol. wt 60,000 and 45,000 daltons); α -LA was found to be homogeneous on both polyacrylamide gel electrophoresis and SDS-polyacrylamide gel electrophoresis (mol. wt 15,000 daltons).

Sugar analogues L-arabinose, L-xylose, D-fructose, D-mannose, D-mannitol and D-galactose did not serve as acceptor substrate for the enzyme. Only ovalbumin served as a good acceptor substrate in the absence of α -LA. Glucose was found to be a good acceptor in the presence of α -LA. The apparent K_m for glucose was 2.86 mM. In the absence of α -LA, *N*-acetylglucosamine was found to be a good substrate. The apparent K_m for *N*-acetylglucosamine was 25 mM. Mn^{2+} was necessary for the enzyme activity in *N*-acetylglucosamine synthetase as well as for lactose synthetase reactions. The apparent K_m for Mn^{2+} was 4.6 mM in *N*-acetylglucosamine synthesis and 4.0 mM in lactose synthesis reactions.

The optimum pH for *N*-acetylglucosamine synthetase reaction of galactosyl transferase was 8.0, whereas that for lactose synthetase reaction was 8.5. The optimum temperature for *N*-acetylglucosamine synthetase as well as for lactose synthetase reaction of galactosyl transferase was found to be 43°C. The chelating agent ethylenediaminetetraacetic acid inhibited *N*-acetylglucosamine synthetase and lactose synthetase reactions of galactosyl transferase by chelating with Mn^{2+} . Inhibition could be overcome by increasing Mn^{2+} concentrations.

Cations like Ca^{2+} , Cu^{2+} and Mg^{2+} showed a negligible effect on the rate of *N*-acetylglucosamine synthetase reaction, while Ba^{2+} , Fe^{2+} and Hg^{2+} caused precipitation of reaction mixture. However, Ni^{2+} , Zn^{2+} and Co^{2+} significantly inhibited the reaction.

Histidine residues of α -LA were modified by diethylpyrocarbonate. Tryptophan residues were also modified by using 2-hydroxy-5-nitrobenzyl bromide either in acidic or neutral conditions. They were also modified by one more specific reagent, 2-nitrophenylsulphenyl chloride.

For his thesis based on the studies, made under the supervision of Dr R.B. Mawal, Shri Sojar was awarded Ph.D. degree by University of Poona. □

CONFERENCE BRIEFS

Chromatography and Mass Spectrometry in Biomedical Sciences

Dr M.C. Saxena of Industrial Toxicology Research Centre (ITRC), Lucknow, attended, on invitation, the International Conference on Chromatography and Mass Spectrometry in Biomedical Sciences held in Bordighera, Italy, 20-23 June 1982. Attended by more than 200 delegates, the conference discussed the latest aspects of chromatography, mass spectrometry and chromatography-mass spectrometry, and their areas of application, including medicine, toxicology, drug research, forensic science, clinical chemistry, and pollution, reports Dr Saxena.

Dr Saxena chaired the session 'Application of high-resolution gas chromatography and mass spectrometry in the organ-directed toxicity of covalently bound exogenous compounds'—a session devoted to the innovations accomplished in the understanding of confirmations and identifications of reactive intermediates involved in various toxicological studies.

The ITRC scientist also delivered a lecture on 'Biological monitoring of pesticides', based on the work carried out in his laboratory on obstetrico-

toxicology of pesticides, in collaboration with Queen Mary's Hospital attached to the Department of Obstetrics and Gynaecology, King George's Medical College, Lucknow. In his lecture, Dr Saxena highlighted the incidence of covalently bound persistent pesticides in various tissues of expectant Indian mothers and their offspring and the associated physiological problems. He also elucidated the current accumulatory trend of lipophilic pesticides like DDT and HCH in the Indian context. □

* * *

WHO expert group meeting on Rehabilitation after Chemical Accidents

Dr C.R. Krishna Murti, Director, Industrial Toxicology Research Centre (ITRC), Lucknow, participated in the WHO expert group meeting on 'Rehabilitation after Chemical Accidents' held at Rome, 28 June-2 July 1982, under the International Programme for Chemical Safety (IPCS). Under this programme, the EURO Regional Office had earlier constituted an expert group to prepare a draft guideline document on 'Rehabilitation of Human Populations and Ecosystems after Chemical Accidents'.

Discussing extensively the document, the meeting agreed on a revised format by consensus, reports Dr Murti. The ITRC Director had edited the chapter on the properties of the chemicals, and had contributed chapters on post-emerging medical care and international collaboration. ITRC had also prepared a case study report on the outbreak of mercury poisoning in Iraq.

Dr Krishna Murti also attended, on invitation, the executive committee meeting of the Scientific Group on Methodologies for Safety Evaluation of Chemicals (SGOMSEC) held on 11 July 1982. The committee, which considered a number of topics for future activities, unanimously agreed to initiate a project on methods of assessing the health effects of complex chemical mixtures, reports Dr Murti. The ITRC Director

PERSONNEL NEWS

Dr R.B. Mitra appointed Distinguished Scientist

Dr R.B. Mitra, Scientist F and head of the Organic Synthesis Division of National Chemical Laboratory (NCL), Pune, has been appointed Distinguished Scientist in the director's grade (24 July 1982).



Dr Mitra (born 31 Aug. 1930) has had a brilliant academic career. A B.Sc. (Hons) and B.Sc. (Tech.) in dyes and chemical technology from the University Department of Chemical Technology (UDCT), Bombay University, Dr Mitra earned Ph.D. (Tech.) also from UDCT for his research, under Dr B.D. Tilak's guidance, on the synthesis, for the first time, of heterocyclic steroid molecules, namely the thiophene analogues of equilenin and estradiol. He did postdoctoral research in USA for five years at three different universities. Dr Mitra's most significant contribution to basic organic chemistry during this phase was his discovery of a photochemical 2+2 cycloaddition reaction of an olefin with cyclohexenone at Harvard University (1962). This reaction has since been exploited by many chemists all over the world for the synthesis of various natural products.

Dr Mitra worked for a year (1958-59) as Senior Chemist in Merck, Sharpe and Dohme (MSD), Bombay, starting their steroid manufacturing activity. He was Reader in Chemical Technology for a year (1962-63) at UDCT. Returning to industry, he rapidly rose, during 1963-

67, from Chemical Production Manager, MSD, Bombay, to Production Manager, CIBA India Ltd, to Works Manager, CIBATUL. His main assignments during this period were the commissioning, start-up and running of brand-new multipurpose plants at MSD and CIBA and the drugs and resin plants of CIBATUL.

In September 1967 Dr Mitra joined NCL as Scientist F and head of the Division of Organic Synthesis. Here his main activity has been process development and basic research in pesticides and agrochemicals. A number of processes developed under his leadership are in commercial production. Recently, he synthesized Indothrin, a new insecticide belonging to modern pyrethroids group. Some highly promising new insecticides and miticides are under test. A recipient of Dr K.G. Naik Gold Medal (1979) of M.S. University of Baroda, Dr Mitra has been associated with a number of professional societies and expert committees. □

Appointments/Promotions**Shri P.N. Chowdhury**

Shri P.N. Chowdhury, Scientist E of CSIR Headquarters, New Delhi, has been appointed on promotion Coordinator (in Scientist F grade) in the Centre for Management Development at National Institute of Science, Technology and Development Studies, New Delhi (7 Sep. 1982).



Shri Chowdhury has been with CSIR since 1961. As head of the Economics Division of Central Leather Research Institute, Madras, during 1961-64, he

also participated in the workshop on 'Quantitative Risk Assessment to Human Health and Ecosystems from Exposure to Chemicals' (Rome, 12-16 July) organized by the SGOMSEC and an international non-governmental group sponsored by the Scientific Committee on Problems of Environment (SCOPE). His report:

The workshop consisted of presentation of summaries of invited papers under three major heads: (i) Procedures for estimating exposure to chemicals; (ii) Quantitative estimation of risk to human health from chemicals; and (iii) Evaluation of tests to predict chemical injury to ecosystems.

At the plenary session, where the participants, constituted into working groups, drafted the joint report and recommendations, Dr Murti chaired the working group on effects on reproduction and health effects other than cancer. Papers presented at the workshop aimed to give overviews of the current status of the methods in use for risk assessment. The most critical end effects of chemicals are recognized to be cancer and disturbance of the mechanism of inheritance mediated by genes. Other important end effects are also noticed on reproduction, growth, muscular activity, process of digestion, absorption and assimilation of nutrients, nerve transmission, immune response, circulation, disposal of waste products, respiration, and behaviour.

The upshot of the workshop was the identification of lacunae in the available methods and areas which need further research efforts. The main gap was in the existing capabilities to extrapolate data generated from laboratory animals to man. The need for integrated information to give a correct evaluation of the methods to predict chemical injury to ecosystems was emphasized. Also highlighted was the urgent need to utilize the data available and to focus the direction of research to move towards the goal of a risk assessment system at the ecosystem level. □

conducted techno-economic surveys on various aspects of leather industry, which led to an information base for decision-making in the programming of leather and allied industries. In 1964 he guided a national survey covering ten national laboratories on their contribution to the gross national product.

Moving over to the Planning Division at CSIR Headquarters in 1964 he has built up various models on planning R&D and worked for their implementation. He has organized several management programmes for scientists and administrators of CSIR laboratories. He has also paid particular attention to technology transfer in rural areas, by organizing all-India workshops on village artisans and science.

A postgraduate in economics from Calcutta University, Shri Chowdhury had earlier started his career at Indian Statistical Institute, Calcutta, where he conducted socio-economic studies on the planning of cottage industries. Later he was with the Economics Department of Calcutta University.

Shri Chowdhury has published more than 60 papers, and articles and authored two books: Economics of R&D; and Science and Society. He has rendered consultancy services to a number of management institutions. □

At Indian National Scientific Documentation Centre, New Delhi, the following have been promoted, on assessment, as Documentation Officer (EI): Shri S.N. Dutta, Shri M.L. Kachroo, Shri A. Joseph, Shri M. Ramachandran, Shri Dinesh Elhence (all effective 1 July 1981), and Smt Kamala Boppana (1 Aug. 1981). Also promoted on assessment is Shri T. Suryanarayana as Reprography Officer (EI) (1 June 1981).

At National Environmental Engineering Research Institute (NEERI), Nagpur, the following have been appointed: Shri V. Muralidhar (Scientist C, 15 July 1982) and Dr (Kum.) S.K. Jain [Scientist B in ICAR-sponsored project, 15 June 1982]. Shri V.A.

Mhaisalkar has been appointed, on promotion, Scientist C (15 July 1982).

Retirements

Dr M.N.S. Murthy

Dr M.N.S. Murthy, Scientist EI, of the Physical Chemistry Division of National Chemical Laboratory (NCL), Pune, retired on 30 June 1982.

With NCL since 1959, Dr Murthy was associated, in earlier years, with recovery and reactivation of the spent nickel catalyst obtained from oil hydrogenation, preparation of exactly stoichiometric BaTiO_3 , and growing single crystals of this compound and making electronic ceramics by a novel coprecipitation technique.

While at NCL, Murthy obtained Ph.D. for his work on electronic spectra of Ni^{2+} and V^{3+} in crystal fields of D_{3h} symmetry. Lately Dr Murthy led a group working on high-permeability manganous zinc ferrites, prepared by using a novel technique employing stabilized oxides.

Dr S.S. Subramanian

Dr S.S. Subramanian, Scientist EI, of the Biochemistry Division of National Chemical Laboratory, Pune, retired on 31 July 1982. He entered the services of CSIR in 1944 in a research scheme on the microbiological conversion of sorbitol to sorbose.

Dr Subramanian started work on the synthesis of vitamin C from sorbitol and was associated with this project throughout the developmental work at NCL. He also contributed to the development of an immobilized penicillin acylase system for the production of 6-aminopenicillanic acid. In collaboration with Dr M.R. Raghavendra Rao, he uncovered the microbial intermediary metabolism of important tricarboxylic acids, and citraconic and citramalic acids.

Dr Subramanian spent a year during 1969-70 on a postdoctoral fellowship with Prof. E.T. Mertz at Purdue University, USA. □

Dr Hari Narain & Dr K.A. Kini re-employed as directors

Dr Hari Narain, Director, National Geophysical Research Institute, Hyderabad, and Dr K.A. Kini, Director, Central Fuel Research Institute, Dhanbad, have been re-employed for a period of six months or till such time as new directors are appointed, whichever is earlier. Both attained the age of superannuation on 30 September 1982. □

PATENTS FILED

253/Del/82: Process for the preparation of secondary plasticizer material for use in plastics industry, G.S. Choudhary, Himmat Singh & I.B. Gulati—Indian Institute of Petroleum, Dehra Dun.

327/Del/82: A device for burning solid fuels for domestic cooking and like purposes, S.K. Rao, M.M. Sen, B. Dasgupta, P.C. Talapatra & G.P. Pal—Central Fuel Research Institute, Dhanbad.

328/Del/82: A device for burning coal for domestic cooking, S.K. Rao, M.M. Sen, B. Dasgupta, P.C. Talapatra & G.P. Pal—Central Fuel Research Institute, Dhanbad. □

ANNOUNCEMENTS

Symposium on Advances in Corrosion Control

The Central Electrochemical Research Institute (CECRI), Karaikudi, will be holding, on 19 November 1982, a symposium on Advances in Corrosion Control. It will cover: (1) Advances in corrosion science and newer techniques in corrosion monitoring with particular reference to impedance and noise measurements; (2) Newer developments in alloying with particular reference to metallic glasses and ion implantation; (3) Development of corrosion inhibitors with particular reference to phosphate-based corrosion inhibitors; and (4) Corrosion in non-aqueous solvents.

Further details regarding the symposium may be had from: The Director, CECRI, Karaikudi 623006. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

Improved ultrasonic testing of solid materials

The wave velocity in rocks and other solids can now be measured by an improved technique—compensated ultrasonic timer technique (CUTT)—developed by Dr Y.V. Ramana and Shri L.P. Sarma of National Geophysical Research Institute, Hyderabad. In this technique, a direct pulse for opening an electronic gate and another delayed pulse for closing it are made use of. A digital readout gives the travel time through the test sample. CUTT has several advantages over the presently popular pulse-transmission technique used in industry and laboratory. The experimental laboratory set-up is sensitive to read-time intervals of $0.1 \mu\text{s}$. The sensitivity can be improved 10 or 100 times with the use of better counters/timers. Reproducibility in wave velocity at present is within 10 m/s. The technique (patent pending) can be used for laboratory as well as field measurements, including measurements at high-pressure and -temperature conditions of direct relevance to geophysics and materials science. □

Marine pollution from heavy metals

Consumption of contaminated fishery products from marine environment poses a great hazard to man. Marine pollution by heavy metals has been observed primarily in coastal waters as a consequence of industrial and domestic sewage discharges and direct dumping of wastes. Heavy metals are always found in marine organisms in traces and appear to be biologically essential.

Whether essential or not, they are potentially toxic to living organisms when in excess in the environment. Hence the importance of investigating not only short-term acute toxic effects of the metal pollutants but also the effects of sublethal exposure to marine organisms to assess the slow, long-term physiological and metabolic changes occurring within the organism. This was the objective of a study made by Shri R. Alfred Selvakumar of National Institute of Oceanography (NIO), Goa. The researcher used a multidisciplinary approach to evaluate heavy-metal-induced biological changes in an estuarine teleost fish, *Therapon jarbua*.

Toxicity studies were also conducted on a bivalve mollusc for comparison. Of the three metals—copper, zinc and cadmium—tested, zinc was least toxic for both the organisms. However, copper and cadmium were specific in their toxicity, i.e. copper was more toxic to the bivalve, and cadmium to the fish. In sublethal concentration, metal-induced alterations in oxygen consumption rate were evident. Copper and zinc significantly reduced oxygen consumption in the fish, while cadmium increased the respiratory activity. Oxygen consumption rate related to gill tissue uptake of metals was examined. The control fishes exhibited the following trend in their metal content: kidney > liver > brain > gills > muscle; metal-wise the trend was: zinc > cadmium > copper. The study suggests the possible use of certain tissues/organs as indicators of metal pollution. A dose-dependent reduction in the haemoglobin content of the blood in the test fish was obvious for the metals tested. Copper and zinc raised the blood

glucose level in relation to the exposure concentration, whereas cadmium significantly reduced the blood glucose level. Respiratory activity, as indicated by the oxygen consumption and the blood glucose levels in the experimental fishes, exhibited an inverse relationship in the three metals tested, indicating stressful conditions in exposed fishes. Based on the results obtained, 'safe concentrations' of the three metals for the estuarine test fish *T. jarbua* have been worked out, and 'application factors' have been derived for heavy-metal pollution monitoring in the tropical estuarine ecosystems.

Shri Selvakumar, who carried out the study at the Centre of Advanced Study in Marine Biology, Porto Novo, of Annamalai University, under the guidance of Prof. V.K. Venugopalan, was awarded Ph.D. degree by this university for his thesis based on the study. □

Toxic effects of cadmium, lead and methylparathion on fishes and invertebrate forms

The toxic effects of three pollutants, namely cadmium, lead and an organophosphorus pesticide, methylparathion, on locally available fish and freshwater invertebrate forms such as snails, daphnia and chironomous larvae have

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been evaluated by Smt. Anuradha S. Gadkari of the Ecology & Ecosystems Division of National Environmental Engineering Research Institute, Nagpur. The results of the study have provided a guideline for waste discharge into water bodies for safe disposal.

The evaluation of toxic effects on some of the exposed animals was based on: (i) alternations in oxygen consumption rates, (ii) histopathological changes, and (iii) behaviour of animals on exposure to toxic substances.

Methylparathion caused more damage to the respiratory process. Histopathological changes were observed in *Heteropneustes fossilis* and *Vivipara bengalensis* on acute and sub-lethal exposures. The salient histopathological changes in varying degrees in fish included necrosis of gill epithelium vacuolation in the hepatocytes of liver, swollen tubules in the kidney, sloughing off of mucosa in the stomach. In snails, the damages were to gills—swelling of tips and loss of cilia; sagging and detachment of mantle and vacuolation in the parenchyma of foot were also noticed.

Smt. Gadkari, who worked under the guidance of Dr V.B. Marathe, former head of the Department of Zoology of Institute of Science, Nagpur, was awarded Ph.D. degree by Nagpur University for her thesis based on the study. □

Dissolving sodium reactions with imines, azines and 1,2-diketones

Aldimines have been known to undergo reductive dimerizations with dissolving metals in aprotic solvents. In some cases, cyclic compounds (imidazolidine derivatives) have been obtained by reactions of the intermediate dihydro-dimeric ion with aldehydes, ethyl chloroformate, and carbon disulphide. Shri S.C. Joshi of the Petrochemistry Division of Indian Institute of Petroleum (IIP), Dehra Dun, has studied the reactions of imines and

related compounds to understand the effects of different alkali metals and solvent polarity on the product structure and yields. This work, carried out at the Chemistry Department of Banaras Hindu University, has led to some interesting results and provided compounds of synthetic importance. Heterocyclic compounds having one or more nitrogen atoms are known to be biologically active. The use of suitable trapping agents gave a better understanding of mechanistic routes to the products.

With a view to preparing several substituted imines, a variety of substrates containing C=N group in different structural environments was used for investigation of reaction with alkali metals. Specifically, the effects of the nature of substituents, of solvent, of temperature, and of metal were investigated. This work was extended to other systems containing the C=N group, such as azines, for the study of alkali metals in different solvents. The intermediate products were trapped using suitable agents like methyl iodide and ethyl chloroformate.

1,2-Diketones were also chosen as substrate, using dissolving metals with a view to preparing cyclic compounds. A probable mechanistic route for the formation of stilbene-1,2-diethyl carbonate has been derived and a possible explanation provided for the 1,2-diketone having a methoxy group for not undergoing normal reaction.

Shri Joshi, who carried out the studies under the supervision of Prof. K.N. Mehrotra, of BHU's Chemistry Department, was awarded Ph.D. degree (1982) by this university. □

Reverse osmosis for separating inorganic solutes in aqueous systems

Using an optimized and specified cellulose acetate membrane, the ionic rejections in either single-solute aqueous systems or mixed-solutes aqueous systems with a common ion have been

correlated with such factors as ionic radius, ion-hydrated radius, ion hydration, ion activity coefficient, and ion position in the lyotropic series. The study was made by Shri C.V. Devmurari of Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar. To predict the membrane performance, the wide applicability of the free-energy parameter concept developed by Sourirajan group has been established. Furthermore, it has been shown that a similar prediction is feasible for a binary electrolyte mixture with a common ion by the approach developed by Agrawal and Sourirajan. For obtaining the desired hike in the feed concentration, a method has been worked out to determine the time-average flux of the membrane.

Shri Devmurari, who had carried out the study under the guidance of Dr M.V. Chandorikar of CSMCRI, was awarded Ph.D. degree in chemistry by Saurashtra University, Rajkot, for his thesis based on the study. □

NAL supplies a data-logging system and an envelope detector to users

The National Aeronautical Laboratory (NAL), Bangalore, has supplied a 50-channel data-logging system for structural analysis applications to Space Applications Centre, Ahmedabad, and an envelope detector to Bharat Heavy Electricals Ltd, Hyderabad.

The data-logging system provides manual, automatic and limited scanning facilities for both single and continuous scans of up to 50-channels of data. It comprises scanning modules, a scanner controller, a signal conditioner, an excitation supply for the strain gauge bridges, an analog-to-digital converter, and a Hewlett-Packard on-line printer. The print-out consists of the signal magnitude and the selected channel.

The envelope detector is a powerful tool which works on the principle of mixing two signals (superheterodyning) and detecting the wanted signal. The instrument consists of a voltage control

oscillator, a mixer, an intermediate frequency (IF) amplifier, filter, a detector, and a variable cut-off low-pass filter. It is used for the analysis of vibration signals obtained in connection with the bearing signature analyzer. □

Plastic-tube cutting implement

A special type of cutting implement which can cut a plastic tube at a particular position without experiencing any strain has been fabricated by Industrial Toxicology Research Centre, Lucknow. Simple and elegant, the cutter



Implement used for transverse dissection of PVC tubes

can be repeatedly used for transverse dissection of any number of PVC tubes of about 0.4×4 cm size. Such a tool is often required for studying the transport phenomenon in cells by partitioning the intracellular compartment from the extracellular one through silicone oil microcentrifugation. □

Chrysanthemum blooming round the year

Chrysanthemum cultivars which can bloom round the year have been produced by National Botanical Research Institute (NBRI), Lucknow. This laboratory, which began work on evolving chrysanthemum cultivars in 1972, has now evolved at least one variety which blooms each month (*see* Table). Because of the availability of chrysanthemum flowers all the year round there will now be no need to transport them during off season to meet the market demands. In north Indian plains, where earlier the normal blooming period used to be November-

NBRI-developed chrysanthemum cultivars with their planting and blooming times

Name	Planting Time	Blooming Time
Lalkila, Nilima Vasantika	Sep.	Jan.
Illinii Cascade	-do-	Feb.-March
Usha	Jan.	April
Jwala, May Day	-do-	May
Rim Jhi, Varsha	Feb.	June-Oct.
Shin Fuji	March	Sep.
Sharada, Sharad Shobha	-do-	Sep.-Oct.
Sharad Mala, Sharad Srinagar, Megami	July	Oct.-Nov.
Birbal Sahni, Apsara, Kundan, Jubilee	-do-	Nov.-Dec.
Flirt, Lilith, Jyotsna Kaumudi	Aug.	Dec.

December, the new varieties will be available round the year.

The cultivars are being widely tested under varying climates for their suitability. □

PROGRESS REPORTS

CBRI Annual Report: 1981

Helping the building construction industry to assimilate and utilize the results of R&D work was the main thrust given by Central Building Research Institute (CBRI), Roorkee, during 1981, as revealed by the annual report of the institute published recently. Towards this end the institute maintained close liaison with the building industry by organizing get-togethers with this industry at Bhopal, Bhubaneswar, Bangalore, and Jaipur. Six of its processes, viz. high-draught kiln, bored compaction piles, water- and weather-proof resin based on cashewnut shell liquid, rapid-setting lime plaster, corrugated roofing sheets from wood wool/coir waste and portland cement, and skirted granular pile, were licensed to 11 parties.

Investigations on the utilization of rejects from coal washery and beneficiation plants showed that the addition of 2-5% ground washery waste to the brick-making soils could increase brick strength by 35-40%. Bricks of strength up to 300 kg/cm^2 and water absorption of 5-8% could be manufactured. Also, substantial savings in fuel during firing could be achieved as the

calorific value of the wastes is about half of that of grade I coal.

Similarly, use of rice husk/rice husk ash as additive with black and red soils of Ramagundam and Visakhapatnam reduced shrinkage and drying losses, improved the strength of bricks, and resulted in less fuel consumption during firing. With the addition of rice husk ash to the extent of 30-40% by weight of the soil, lightweight bricks of $1250\text{-}1350 \text{ kg/m}^3$ density, of $50\text{-}55 \text{ kg/cm}^2$ strength, and of 18-25% water absorption could be manufactured.

A brick-moulding table with a capacity for making 1000-1200 bricks per 8-hr shift was developed. The quality and finish of the bricks moulded by using the gadget was found to be far superior to those moulded through conventional methods.

In soil engineering, an important project, being jointly investigated with Building Research Establishment of UK, is the study of the load transfer mechanism in multi-bulb piles developed by CBRI.

A stationary piston sampler was designed which can be pushed down into the ground by a device capable of holding and locking the piston while the sampling tube is pushed into the ground to a limit force of 5 tonnes. The arrangement permits convenient withdrawal of the loaded sampling tube. The design is an improvement over the designs of indigenously available samplers.

An integrated system for winter heating and summer cooling using rock bed energy storage was designed. For room heating in winter, solar air heaters have been used in conjunction with the rock bed system. The performance of the system for winter heating of an experimental room was found to be satisfactory.

An instrument for measuring the extent of corrosion in steels was developed. Working on the principle of electromagnetic induction, it can detect changes in thickness due to corrosion down to 0.25 mm.

A press together with ancillaries for manufacturing sand-lime/fly ash-sand-lime bricks was developed. It comprises a double-shaft mixer, a rotary table press, an autoclave, and a boiler. The equipment developed earlier for handling and placing prefabricated components was successfully tried at the construction site of a three-storey building in New Delhi.

A study undertaken to standardize the design, dimensions, and production system of school furniture and fittings led to the identification of a minimum number of standardized elements for prefabrication of class-room chairs, desks, and squatting tables.

Plans and construction systems were developed for constructing a large number of primary schools in difficult terrains of Arunachal Pradesh with local resources and skills.

A development strategy based on the concept of integrated area development was evolved for Baraut region of Meerut district. It has been adopted by the Uttar Pradesh government as part of its district development plan. A study on environmental improvement of the highly polluted urban belt along the railway corridor was carried out and guidelines were formulated for environment planning and improvement.

A study was conducted on the type of houses built by villagers in Dehra Dun and Chakrata regions of Uttar Pradesh. Alternative designs were proposed which, while fulfilling the functional

aspects and based on locally available materials, brought down the construction cost.

Manually pressed thatch panels were developed for the roofing of rural houses. The institute also proposed designs for low-cost poultry sheds. Half-brick staggered load-bearing wall and R.C. plank roofing schemes were adopted for constructing 100 houses for slum dwellers at Bhopal. The wastewater disposal system developed earlier was also provided in these houses. The R.C. plank roofing scheme was adopted in the construction of 24 LIG (low-income group) and 20 EWS (economically weaker section) houses at Sikandrabad. Ten demonstration houses were constructed at Rishikesh by using stone masonry blocks for walling and R.C. plank/thin in-situ ribbed slab for roofing. For the benefit of rural poor, techniques of non-erodable mud plaster, fire-retardant treatment for thatch roofs, and wastewater disposal system were demonstrated at Gokula (Bihar). Similarly, a demonstration of fire-retardant treatment of thatch roofs was arranged at Raipur (Madhya Pradesh).

The institute organized an international seminar on 'Planning, Design and Construction of Load Bearing Brickwork Buildings for Developing Countries' in collaboration with University of Edinburgh, UK.

NAL Annual Report: 1980-81

The annual report of National Aeronautical Laboratory (NAL), Bangalore, for 1980-81 shows that the laboratory continued to associate itself with the R&D programmes of aerospace organizations. During the year, agencies like the Department of Space, Hindustan Aeronautics Ltd (HAL) and Aeronautics Research and Development Board (ARDB) assigned the laboratory 22 new sponsored/grant-in-aid projects worth about Rs 46 lakh, besides 9 consultancy assignments. The receipts of the laboratory amounted to

about Rs 106 lakh against a financial input of about Rs 414 lakh. The NAL processes relating to (i) bonded wire strain gauge column type load cell and (ii) electrical resistance wire strain gauges went into commercial production.

The laboratory continued to provide wind tunnel facilities to outside organizations and for meeting the in-house requirements. The major test programmes executed during the year included: data generation on high-lift and manoeuvre devices, roll-damping measurements, and effect of jet plume temperature on aft body drag. Work on augmenting the 1.2 m trisonic wind tunnel was continued and efforts were being made for the setting up of an additional 0.6 m transonic leg. Once commissioned, the facility would be used for testing aerospace model configuration, mainly in the transonic regions of up to Mach 1.2.

A fibreglass epoxy resin impregnating tape manufacturing model was designed and developed for HAL, Bangalore. The machine produces unidirectional composite tapes at the rate of 6 m/min. and facilitates fabrication of helicopter blades and various fighter aircraft components.

A brake pad material friction test rig was developed for HAL, Hyderabad. Such rigs are used to carry out acceptance tests for frictional properties on ready-to-use brake pads used in high-energy braking systems such as in aircraft. At a time, a pair of brake pad samples can be tested, each having an area of 33 cm². The conditions simulated during test are essentially the same as those met in actual practice.

A closed-circuit centrifugal compressor research rig which could operate with different gaseous media was being set up under a UNDP project.

The conventional system of stabilizing flame in a jet engine afterburner is accomplished by the use of V-gutters which produce high pressure losses during non-afterburning mode of the engine operation. The laboratory has

overcome this drawback through the development of a jet curtain flameholder. It is basically a small cylinder from which jets of air-fuel mixture are issued normal to the external flow, producing negligible cold pressure losses in addition to entraining a greater quantity of mainstream flow into its recirculation zone. This results in higher combustion efficiencies. As the metal temperature remains quite low the life of the flameholder is enhanced.

In association with the Design and Development Group of HAL, Bangalore, the laboratory concluded a structural response investigation on a typical fighter aircraft wing with both sinusoidal and transient inputs. Besides yielding interesting results the studies helped in establishing and evaluating various testing techniques.

A low aspect ratio wing, typical of missiles, meeting the static and dynamic requirements was designed and developed. It was built using indigenous materials and typical riveted aircraft type construction. Static and dynamic tests gave satisfactory results.

A 240-tonne electronic weighing system for the rotary wagon tippler built by Heavy Engineering Corporation Ltd, Ranchi, was designed and fabricated. The system, installed at the coal handling facility of the Bongaigaon Thermal Power Station, comprises eight instrumented axles using strain gauges as the load sensors. Signals from the axles are processed and digitally printed on a teleprinter. A feature of the weighing system is that its incorporation in the wagon did not require any structural alterations.

A magnetic test bench was developed for studying the magnetic properties of materials. It is capable of measuring the hysteresis loop and other parameters like retentivity and coercivity of materials both in the powder form and in the rod form. It was being employed for studying the magnetic properties of samples of chromium dioxide prepared in the laboratory for application in alloy tapes under development.

Two international conferences, First Asian Congress of Fluid Mechanics and Fifth International Symposium on Air Breathing Engines, were organized with NAL as one of the sponsors.

* * *

CIMAP Annual Report: 1981-82

The Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, investigated as many as 115 projects during 1981-82, according to its annual report for that period. These included 31 new projects, 14 completed projects, and three dropped. One of the major achievements of the laboratory was the isolation of a new strain of *Claviceps paspali* which could produce a significant amount of ergometrine. Total alkaloids isolated from one of the isolates contained: 25.7% ergometrine, 20.5% lysergic acid amide, 18.4% ergometrinine, and 8.5% lysergic acid. Lysergic acid and its amide are important precursors for the synthesis of therapeutically important ergot alkaloids. Development of strains from which these two can be produced has already been reported by a number of firms, but the development of a strain that could produce ergometrine has been reported for the first time.

The newly developed ergocryptine and ergometrine strains were produced on a commercial scale and these would be available to the industry next year. A new strain of *Aspergillus* was also isolated which produced ergot alkaloids in saprophytic culture.

A superior strain of *Mentha piperita* was evolved at Tung (Darjeeling) that showed better growth, had a higher oil content, and was drought-resistant. Two promising clones one each of lemongrass and citronella Java were evolved through genetic improvement.

A new strain of spearmint was introduced from USA which was superior to the local strain in height of plant, and herb and oil yields. The strain offered good possibilities for large-scale cultivation.

Agronomical experiments to maximize the yield of citronella Java indicated that three harvests with normal doses of nitrogen give higher yields than six harvests with heavy inputs of nitrogen.

Chemical weed control experiments were carried out in aromatic grasses, Egyptian henbane, German chamomile, Japanese mint, and *Dioscorea floribunda*. It was observed that Oxyfluorfen could be used for effective control of weeds in chamomile. Diuron was found to be an efficient weedicide for all the aromatic grasses including citronella Java, palmarosa, and lemongrass. A number of new insect pests damaging medicinal and aromatic plants were determined. Experiments for effective control of mentha leaf folder *Syngamia abruptalis* were carried out. In addition, bioefficacy of different systemic insecticides against aphids of black henbane and Egyptian henbane was studied; Methyldemeton, Dimethoate, and Phosphamidon were the most effective.

A new bacterial disease of Egyptian henbane was discovered and etiology of the disease was investigated. A bacterial stalk-rot affecting opium poppy was also discovered for the first time in India.

Alkaloids from the leaves of *Duboisia myoporoides*, collected from CIMAP's farms at Lucknow and Bangalore, were isolated through the selective solubility technique. The Lucknow and Bangalore samples gave respectively: hyoscyne-56%, 22%; and hyoscyamine-36%, 51%. Besides, the Bangalore batch gave 17% 6-hydroxyhyoscyamine.

The process for the preparation of raubasine from *Catharanthus roseus* roots was improved and overall yields obtained were 0.15-0.18%. The process was being scaled up.

The root oil from *Angelica archangelica*, growing wild in Kashmir and Sikkim regions, was found to be acceptable in the Indian market. The price of the oil in London market is Rs 10,000 per kg.

The process for the production of lavender was upgraded from pilot-scale to semi-commercial scale. More than 20 kg of oil was sold to the industry. Similarly, the first lot of 5 kg of clary sage oil was produced in Kashmir and was found to be acceptable to the industry. The oil quality was at par with that of the best available oil in Europe.

As part of its rural development programme, CIMAP and its regional centres, especially in Bangalore and Jammu & Kashmir, intensified their efforts to help small and marginal farmers in not only cultivating medicinal and aromatic plants but in distillation of oils therefrom.

The commercial unit at Jammu and Kashmir, which produced materials worth Rs 33.285 lakh, continued to be the sole supplier of ergot, pyrethrum oleoresin, belladonna and belladonna alkaloids to the indigenous pharmaceuticals industry and consequently saved about Rs 13 lakh in foreign exchange.

For developing effective control measures of viral diseases of medicinal and aromatic plants, a Discipline of Plant Virology was set up at CIMAP Headquarters. □

CONFERENCE DEPUTATION BRIEFS

Prof. M.M. Taqui Khan

Prof. M.M. Taqui Khan, Director, Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, attended the International Chlorine Symposium-1982 (London, 1-4 June 1982), sponsored, among others, by the Royal Society of Chemistry. Dr Khan reports that the symposium provided an excellent opportunity not only to the scientists but to the men in chlor-alkali industries to gain first-hand information on the recent technologies. The CSIR delegate further reports that the symposium discussed in depth such topics as: energy and effect of rising energy costs on the worldwide structure of chlor-alkali industries; development and application of chlorine technology

in Europe, USA and Canada; diaphragm cells; asbestos diaphragms; polypropylene glycol bipolar diaphragm; membrane cell technology, conversion of existing chlor-alkali plants to membrane cells; developments in perfluorocarboxylic acid membranes and electrolysis technology for Azec (polymeric anionic membrane) system, and related areas.

Proceeding to USA from UK, Prof. Khan was at the Department of Chemistry, Texas A & M University, Texas, as a Visiting Scientist (5-12 June, 18 June-2 July). Here he had discussions with scientists on future collaboration with this university in investigations in coordination chemistry and homogeneous catalysis.

Participating in the World Hydrogen Energy Conference-IV held at California Institute of Technology, Jet Propulsion Laboratory, Pasadena (13-17 June), Prof. Khan reports that the most economical sources of hydrogen, as revealed at the conference, are (i) water gas shift reaction cycle and (ii) methane shift reaction cycles. Subsidiary methods of production are through various regenerative thermochemical cycles and electrolysis of water, both being energy-intensive. These could become economically viable only when nuclear energy or electricity becomes cheaper, observes the CSIR delegate. According to the CSMCRI director, some of the CSIR laboratories, CSMCRI in particular, could take up work on the low-energy production of hydrogen from the water gas shift reaction and methane shift reaction by developing suitable catalysts. Work could also be initiated on the thermochemical cycle and patholytic production of hydrogen.

Prof. Khan also visited Mexico (3-9 July) under the Indo-Mexican Programme of Coöperation in Science and Technology, his chief interest in that country being the working of solar energy based desalination plants, especially at the Sontlan Project. □

DEPUTATION BRIEFS

Dr G.N. Acharya

Dr G.N. Acharya of Central Electronics Engineering Research Institute (CEERI), Pilani, paid a familiarization visit to the research laboratories in the departments of electrical and electronics engineering of some of the leading British universities from 1 to 12 September 1982. During the visit, under CSIR-British Council Programme, he acquainted himself with the research programmes in electronics control systems in the universities of Loughborough, Bristol, and Bradford. He held discussions with scientists at Bradford on a collaborative R&D programme on 'Microprocessor-based electronic control systems using PWM (pulse with modulation) solid-state ac drives' and examined the facilities available for the programme in the computer centre and the microprocessor application laboratories in the Electrical and Electronics Engineering Department of Bradford University. A proposal for a joint research programme on 'Microprocessor-based PWM ac drives for transportation', to be carried out in two phases at Bradford and at CEERI, was prepared jointly by Dr Acharya and Prof. William Shepherd of this University, reports the CEERI scientist. □

PERSONNEL NEWS

Appointments/Promotions

At Central Electrochemical Research Institute, Karaikudi, the following Scientists EI have been promoted, on assessment, as Scientists EII (all effective 23 Feb. 1982): Dr P.B. Mathur, Shri R. Srinivasan, Shri G.S. Subramanian, and Dr V.K. Venkatesan. Dr K. Balakrishnan, Scientist C, has been appointed on promotion, Scientist EI (17 June 1982). Brief profiles of the scientists:

Dr P.B. Mathur

Dr Mathur (born 19 Oct. 1928) obtained his M.Sc. (Chem.) and D.Phil. degrees from Allahabad University in 1953 and

1956 respectively. Joining CECRI in 1958 as Senior Scientific Officer, Dr Mathur has specialized in electroplating and metal-finishing, metallurgy, and batteries. De-zincing and de-tinning processes for recovering zinc and tin metals from waste scraps, magnesium-silver chloride batteries for naval applications, cuprous chloride batteries for meteorological applications, and silver oxide-zinc batteries for aircraft applications are some of the processes in the development of which he has been associated and which have won him several awards. Some of them have been released to industry for commercialization. Deputed to USA in 1971, he acquainted himself with the latest developments in battery research and allied fields of electrochemistry. He has to his credit 110 research papers and 33 patents. He is a fellow of Indian Chemical Society and Indian National Science Academy; a founder-member of Society for the Advancement of Electrochemical Science and Technology, he was one of its vice presidents in 1974.

Shri R. Srinivasan

Shri Srinivasan (born 18 Nov. 1927) obtained his B.Sc. (1947) and B.Tech. in chemical engineering (1949), both first class, from Madras University. He has been with CECRI since 1954. Deputed to Canada in 1963, he received advanced training in process metallurgy in University of Toronto. His contributions in electrometallurgy relate to extraction of gallium, iron powder, silver refining, and electrolytic chromium. He has also carried out pilot-plant investigations on electrolytic manganese dioxide and anodic phosphating. He was associated with the development of the process for iron powder, which won the National Research Development Corporation of India's invention award. Two of the processes developed by him have been released to industry. He has to his credit 41 research and 24 review papers, and eight patents.

Shri G.S. Subramanian

Shri Subramanian (born 26 Jan. 1927), who holds a degree in chemical engineering, joined CECRI in 1953. In 1957 he was deputed to West Germany for advanced training in chemical engineering. He has contributed to electroorganic synthesis and to developing techniques for the preparation of calcium gluconate, *p*-aminophenol, benzidine and substituted benzidine and other chemicals. He won the National Research Development Corporation of India's invention award in 1965 for developing an electrochemical process for hydrazobenzene. He has to his credit 30 research papers and ten patents. He is a founder-member of the Society for Advancement of Electrochemical Science and Technology and a member of Indian Institute of Chemical Engineers.

Dr V.K. Venkatesan

Dr Venkatesan (born 16 May 1933) obtained his B.Sc. (Honours) (1954) and M.Sc. (1956) in chemistry from Annamalai University, and Ph.D. (1966) in electrochemistry from Moscow State University. With CECRI since 1957, he was deputed to UK in 1974 for a familiarization visit. Dr Venkatesan has specialized in the study of the electrical double layer and the influence of the structure of the double layer on the kinetics of electrode processes. His current interest is in electrocatalysis of hydrogen-oxygen reactions with particular reference to hydrogen-oxygen fuel cells. He has to his credit about 60 research and review papers and five patents. A fellow member of the Society for Advancement of Electrochemical Science and Technology, he was one of its vice presidents in 1981-82. □

Dr K. Balakrishnan

Dr Balakrishnan (born 15 June 1935) obtained his M.Sc. in 1957 from Osmania University, Hyderabad. With CECRI since 1957, he earned Ph.D. degree of Madurai University in 1975.

He was deputed to West Germany in 1961-62 and to Bulgaria in 1977. Dr Balakrishnan has been working on the kinetics of corrosion processes and development of anti-corrosion products. He has developed alloy anodes based on zinc and magnesium for cathodic protection, inhibitors for cooling waters, and a low-temperature phosphating formulation for iron, steel, and zinc. He has to his credit 70 research papers and eight patents. He is a fellow member of the Society for Advancement of Electrochemical Science and Technology.

* * *

At Central Road Research Institute, New Delhi, the following have been promoted consequent upon assessment:

As Scientist C: Shri Ajaib Singh (9 Nov. 1979), Shri O.P. Aggarwal (9 Nov. 1980), Shri S.R. Vijayaraghavan (9 Nov. 1980), Shri I.R. Arya (16 Nov. 1980), Shri Jagdish Mittar (27 Nov. 1980), and Shri B.L. Parasher (6 Nov. 1981)

As Scientist B: Shri N.D. Vermani, Shri P.C. Verghese, Shri R.N. Sharma, Shri B.M. Sharma, Shri P.D. Satija, Shri K.A. John, Shri N.K. Goswami, Shri Narinder Krishan, Shri H.S. Mehta, Shri Panchanan Oli (all from 24 Feb. 1981), Shri Ravi Prakash (20 May 1981), and Shri O.P. Bhatnagar (14 June 1981)

As Photographic Officer A: Shri S.K. Rishi (29 Dec. 1981).

Shri M. Dinakaran

Shri M. Dinakaran of Central Road Research Institute (CRRI), New Delhi, has been promoted, on assessment, as Scientist EI (1 Sep. 1981).

Shri Dinakaran (born 15 June 1939) obtained his B.E. in civil engineering in 1961 from College of Engineering, Guindy, with first class. With CRRI since 1964, Shri Dinakaran has specialized in rigid pavements, his work including analytical work in rigid pavements, and studies on special pavement systems, new test procedures, and concrete materials. He has been associated with several of CRRI's

consultancy projects in concrete airfield pavements, and taken part in training programmes. He has to his credit more than 25 publications including technical consultancy reports. A member of Indian Roads Congress (IRC), he has represented CRRRI on various committees of IRC and Indian Standards Institution. Deputed to East Germany in 1974-75, he received advanced training in highway engineering with special reference to rigid pavements. Currently he is on an assignment with the Government of Iraq.

* * *

At Central Glass & Ceramic Research Institute, Calcutta, the following have been promoted as Scientists EI: Dr S. Thyagarajan (17 March 1982); Dr S.K. Das (17 March 1982), Shri K.K. Phani (1 July 1982), and Dr K.N. Maiti (21 July 1982)—at CGCRI's extension centre at Khurja.

* * *

Dr M. Mariappan

Dr M. Mariappan, head of the National Environmental Engineering Research Institute's Madras zonal laboratory, has been promoted, on assessment, as Scientist EI (21 July 1982).

A graduate in civil engineering from Madras University, a postgraduate (M. Tech.) with specialization in environmental and sanitary engineering from Indian Institute of Technology, Kanpur, and a Ph.D. from University of Missouri, USA, Dr Mariappan has specialized in waste treatment, environmental impact analysis and systems analysis.

Prior to joining NEERI as Scientist C in charge of the institute's Cochin zonal laboratory in 1978, Dr Mariappan had served as Junior Engineer in Public Works Department of Tamil Nadu (1963-64), and this state's educational service. He was chairman of the task force for establishing a school of environmental studies at University of Cochin. He is a member of board of studies in applied chemistry and

environmental studies of this university and is on the editorial board of *Indian Journal of Environmental Health*. Has 20 publications to his credit.

Honours & Awards

Dr B.S. Mathur

Dr B.S. Mathur, head of the Time and Frequency Section of National Physical Laboratory, New Delhi, has been elected Consultant to Commission 31 (Time) of the International Astronomical Union at the eighteenth general assembly of the union held at Patras, Greece, in August 1982. Dr Mathur had earlier represented India at the interim and final meetings of the International Radio Consultative Committee (study group VII on Time) held at Geneva, Switzerland, in June 1980 and September 1981. It may also be recalled that NPL, by virtue of its achievements in time and frequency, was elected to the prestigious Consultative Committee for the Definition of Second of the International Committee on Weights and Measures at a meeting held at Paris in September 1980.

* * *

Dr I.B. Gulati

Dr I.B. Gulati, Director, Indian Institute of Petroleum, Dehra Dun, has been appointed chairman of the coordination council for chemical sciences group for a period of two years effective 1 October 1982, in place of Dr G. Thyagarajan, Director, Regional Research Laboratory, Hyderabad. □

ANNOUNCEMENTS

Seminar on Cooperation in Information Management

A seminar on 'Cooperation in Information Management' will be held on 17-18 January 1982 at National Metallurgical Laboratory (NML), Jamshedpur. It is being organized jointly by Indian National Scientific Documentation Centre, New Delhi, National Institute of Science, Technology and Development Studies, New Delhi, Publications and

Information Directorate, New Delhi, Society for Documentation and Information Science, Jamshedpur, and NML.

Meant for librarians, documentalists, information scientists, planners and managers of information systems, and information users, the seminar will have technical sessions on: (i) Approach to planning integrated information systems; (ii) Design and organization of integrated information systems; (iii) Prospects for application of modern technologies in information handling; and (iv) Framework for cooperation in developing integrated information systems.

The deadline for submitting contributed papers, to be sent to Scientist in charge (Shri T.S. Rajagopalan), Indian National Scientific Documentation Centre, Hillside Road, New Delhi 110012, is 15 November 1982. Further details obtainable from: Shri M.L. Sharma, Seminar Organizing Secretary, National Metallurgical Laboratory, Jamshedpur 831007.

* * *

Tanners' Get-together and Leather Week

The eighteenth Tanners' Get-together will be held at Central Leather Research Institute (CLRI), Madras, during 31 January-4 February 1983. The topic for discussion is 'The integrated development of the Indian leather and allied industries'.

The 'Leather Week', an annual feature in which tanners, technologists, scientists, leather goods and footwear manufacturers, and policy-framers from India and abroad participate, will be observed during 31 January-6 February 1983.

Those desirous of presenting papers at the get-together should send an abstract of the paper before 15 November 1982 and the full text by 15 December 1982 to: The Conveners, Eighteenth Tanners' Get-together, Central Leather Research Institute, Adyar, Madras 600020. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

CEERI's electronic process control instrumentation for sugar industry commercialized

Two electronic process control instrumentation systems which Central Electronics Engineering Research Institute (CEERI), Pilani, had developed for sugar industry [CN, 29(1979), 162] under a grants-in-aid project funded by the Electronics Commission, have been tested in commercial sugar factories for two seasons. The two systems are: (i) automatic liming and pH control system for continuous juice sulphitation stage, and (ii) 'panometer'—an ac resistivity measuring unit for the massecuite boiling in vacuum pans. Tests showed that measurable benefits would accrue by the introduction of these electronic systems.

After joint consultations with Electronics Trade and Technology Development Corporation (ETTDC), New Delhi, and Electronics Commission, two parties were identified in the first phase to commercialize the know-how. These are: (i) Central Electronics Ltd, Sahibabad, a public sector undertaking; and (ii) Satwik Electric Controls Pvt. Ltd, Nasik, in private sector. The technology was transferred through ETTDC.

In addition to the supply of know-how, comprising essential information to manufacture the instrumentation and test procedures to meet the specifications, training was imparted to engineers from the two collaborating firms. The engineers were trained to assemble one prototype each with their own components and materials and test them to the given specifications under the guidance of CEERI scientists.

Both the firms have made impressive progress in the productionization. Installed in a number of sugar factories, the systems are giving satisfactory service to the users.

* * * Successful field trial of temperature indicating and monitoring systems for sugar industry

The automatic centralized precision temperature indicating and monitoring system designed and developed at Central Electronics Engineering Research Institute, Pilani, consisting of 4½-digit 'system grade' temperature indicator unit, automatic precision scanner-multiplexer unit, 24-point digital display panel unit and control-status indicator units, was successfully field-tried at Simbhaoli Sugar Mills (Dist. Ghaziabad), continuously for two months during 1982. All the temperature data-point values were simultaneously displayed on the display panel and updated after suitable intervals. The temperature points covered in the field trial belonged to juice clarifiers, evaporators, pans, crystallizers, boilers, and sulphur furnaces. One display unit of the digital display panels consists of 3 or 4 digits of 1-in. LEDs for indicating updated temperature data of a point every 2 min., which can be reduced to a minimum of 24s in the present system. The display units (7 in. × 7 in. each) have a novel comparator circuit for low, high or inband indication.

The digital status of control signals is transmitted on a 2-pair wire to the

attendant of a particular point for adjusting the corresponding manipulated variable accordingly. Provision has been made to incorporate a parallel-BCD and parallel-bit input digital printer to record data of all the channels at suitable intervals, say 10, 20 or 30 min. Type K thermocouples were employed for accurate measurement of not only the higher side of temperature range but also the lower one such as that of injection inlet water and crystallizers. The system accuracy was $\pm 1^\circ\text{C}$ over the range with a resolution of 0.1°C . It is worthwhile noting that a $4\mu\text{V}$ signal corresponding to 0.1°C was being transmitted over a maximum length of 100 m of compensating cable to the indicating and monitoring station which was located in the environment of the sugar mill where ambient temperature rose up to about 50°C in summer and where severe electrical disturbances and mechanical vibrations were present. In spite of such adverse environmental conditions there was no deterioration of accuracy or jumping of fractional decimal digits of the indication and no failure occurred in the system, which worked continuously for 60 days. □

Sophisticated corrosion measurement console installed at CECRI

A corrosion measurement console (model 350 A Princeton Applied Research, USA), has been installed at

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Corrosion measurement console installed at CECRI, Karaikudi. This versatile microprocessor-based instrument performs a host of electrochemical corrosion experiments.

Central Electrochemical Research Institute (CECRI), Karaikudi. This is the most advanced instrumentation package for laboratory measurement of the electrochemical corrosion phenomenon, capable as it is of many complex corrosion measurements.

A versatile 16-bit microprocessor defines the experiment, makes the measurement, replays the data, and calculates and prints the results. The system performs the most popular electrochemical corrosion experiments as: potentiodynamic polarization plots (anodic, cathodic or both), Tafel plots (anodic, cathodic or both), polarization resistance plots, potentiostatic measurements, galvanic corrosion measurements, pitting scan, corrosion behaviour diagrams, and sensitization tests.

With IR compensation module, it is possible to correct the uncompensated resistance of the cell. □

Wear- and abrasion-resistant cast iron alloy

A wear- and abrasion-resistant cast iron alloy has been developed by National Metallurgical Laboratory (NML), Jamshedpur, from indigenous raw materials. Designated as 'NML Wearnor', the alloy is suitable for the manufacture of impeller blades used in

hot blasting machines, which in turn are employed in foundries for the fettling of castings. Trials carried out in steel foundries by Mining and Allied Machinery Corporation, Durgapur, have shown that the NML alloy can be melted in dc arc furnaces; has satisfactory flowability and castability, and hardness in 'as-cast' conditions with respect to machinability; and that it attains high hardness after heat treatment. Furthermore, the suitability of NML Wearnor has been established in the production of river water intake pumps, ash-handling plants, peripheral liners of coal mill exhausters for thermal power plants, slurry pumps, and similar other mining and metallurgical equipment and machinery. □

CRRI's guidelines for improving Bombay roads

The Bombay metropolitan city roads, like several other metropolitan roads, have many major defects: (i) deterioration of road surface around manholes, (ii) shoving and shifting of bituminous road mix to the side, (iii) development of pot holes during rainy season, (iv) frequent road cutting for providing utility services, and (v) loss of riding quality of the pavement at intersections. These defects have been thoroughly investigated by Central Road Research

Institute, New Delhi, and guidelines have been worked out for rectifying the defects. For maintenance of road surface around manholes, a mastic asphalt composition has been developed. For repair of pot holes during rainy season, storageable bituminous mixes treated with an antistripping agent, 10% by weight of bitumen, have been suggested. Specifications have been evolved for preventing shoving of bituminous road mix, for reinstatement of utility cuts, and for maintaining the road surface at busy intersections. □

Container-filling machine

The Central Food Technological Research Institute (CFTRI), Mysore, has developed a pedal-operated volumetric filler for filling granular and powdered materials in unit packs. The gadget is useful in grocery shops and departmental stores. The material to be filled is placed in a hopper which leads to a telescopic cylindrical volumetric measure mounted on a rotating disc. The disc rotates, with the pressing of a pedal, to a point where the measure filled with the material aligns with a chute. The material slides down the chute into a unit container when the pressure on the pedal is released; the disc goes back to its normal position with an impact shaking the hopper. This helps



Container-filling machine developed by CFTRI

the down flow of even non-free-flowing material.

The gadget can be employed in the volume range 300-600 ml, the volume being fixed by adjusting the telescopic overlap of the cylinder. □

Enriching cassava meal by single-cell protein

With the global demand for food protein rising with increasing population protein deficiency is estimated to touch a figure of 13 m tonnes in 1985 and 22 m tonnes in 2000. In this context, single-cell proteins (SCP) provide a solution by which edible proteins can be produced on a large scale with the help of natural microorganisms, requiring no farms.

The choice of the substrate plays a major role in SCP production. The substrates currently used for SCP production are hydrocarbons (*n*-paraffins) and ethanol. However, with the fast depletion of petroleum crudes and the possible utilization of ethanol as motor fuel, the time has come to look for other viable substrates like carbohydrates, which hold out promise as cheaper substrates for SCP production. Also, unlike hydrocarbons, the problems of toxicity may not arise with carbohydrates.

Cassava (*Manihot esculenta*) is a potentially high source of carbohydrate (starch). Although the carbohydrate content is high in cassava, its protein content is extremely low, resulting in cases of malnutrition when the main constituent of diet is cassava. It is against this background that a researcher, Shri T.V. John, at Indian Institute of Petroleum (IIP), Dehra Dun, has attempted to enrich cassava meal with SCP by a single-step fermentation process, preferably with a yeast. Among the different microorganisms screened, the yeast strain IIP 4, belonging to the species *Candida tropicalis*, could be adapted to grow on starch and the adapted strain, IIP₄-M₃, was used for further studies. Shake flask experiments with starch as the only source of carbon

and energy showed that the adapted strain had a maximum specific growth rate of 0.76 h⁻¹ with a saturation constant of 0.125 g/litre.

Through bench-scale batch experiments in a 2.5-litre capacity fermenter, the optimum growth conditions with respect to the specific growth rate on cassava meal were determined. At temperatures of 36 ± 2°C., pH of 4 ± 0.2, aeration of 0.235 VVM and above and at an agitation rate of 1500 rpm, IIP₄-M₃ showed a specific growth rate of 0.73 h⁻¹ and a yield coefficient of 0.49 g of fermented cassava meal per gram of the meal. The activation energy for the growth of IIP₄-M₃ was found to be 50 kcal mol⁻¹.

Bench-scale semi-continuous fermentations were conducted with the same fermenter at varying dilution rates from 0.1 to 0.75 h⁻¹ to check the stability of the strain. Up to 0.4 h⁻¹ dilution rates the cell concentrations were almost constant, and above 0.4 h⁻¹ dilution they started declining; a complete washing-out was observed at a 0.75 h⁻¹ dilution rate. The maximum biomass productivity was observed at a dilution rate of 0.57 h⁻¹.

Enzymatic studies showed that the hydrolysis of cassava starch took place with the help of extracellular carbohydrases, viz. α-amylase, β-amylase and amyloglucosidase, excreted by the yeast. The activity of these enzymes was found to increase almost parallel to the exponential phase of the growth of the organism.

The SCP obtained contained 47% protein, 35% carbohydrate and 4% lipid. The essential amino acid profile of this SCP was found to be relatively balanced except for methionine, and the protein was rich in lysine.

Shri John was awarded Ph.D. degree (1982) by M.S. University of Baroda for his thesis based on the study. □

PROGRESS REPORTS

RRL-Jammu Annual Report: 1981

The annual report of Regional Research Laboratory (RRL), Jammu, for 1981,

brought out recently, highlights its R&D activities in the fields of aromatic and medicinal plants, minerals, fur and wood and food technologies, insecticides, cellulose pulp and board, and surface coatings. The laboratory was associated with the commissioning of a number of commercial plants, and development of several processes. Mention may be made of those relating to: turpentine oil fractionation, diosgenin, terpeneol, pine board, furfural, hops drying, and isolation of α-, β- and γ-picolines and lutidine from crude pyridine bases. Work on vasicine and its analogues was continued with respect to their anti-haemorrhagic, thrombopoietic and anti-cholinesterase activities. Technology for growing *Eucalyptus youmanii* and *E. macro-rhyncha* in Palampur region and extraction of rutin from their leaves was released to two firms who would be able to meet the country's entire demand for rutin.

The laboratory's process on turpentine oil fractionation was released to Jammu Pine and Synthetic Products, Jammu. The firm has installed and commissioned under the supervision of RRL-Jammu staff a plant with capacity to process 8 lakh litres per annum of turpentine oil to get high purity α-pinene, β-pinene, Δ³-carene, longifoline, and pine tar. Based on the laboratory's pilot plant studies, details were being worked out for setting up a plant to process 1000 litres of α-pinene per batch to produce terpeneol.

A melter-mixer was designed and commissioned by the laboratory for Prabhat Terpenes and Synthetics (P) Ltd, Jammu. Improved yields of turpentine oil were obtained with the commissioning of the melter-mixer, resulting in a saving of Rs 20 lakh per annum. The same firm was earlier provided process know-how for the production of hydrogenated rosin and disproportionated rosin.

The diosgenin-progesterone manufacturing plant, which was shipped to Burma last year, was successfully

commissioned. Another plant (capacity 1500 kg of raw material per batch) for the production of diosgenin was successfully installed and commissioned at Gairibas, Darjeeling district, for the Directorate of Cinchona & Other Medicinal Plants of the Government of West Bengal.

An electrically operated hops drier was installed and commissioned at Kirting, Himachal Pradesh. The walnut bleaching and washing machine demonstrated last year received good response from the traders and exporters. A continuous commercial unit for walnut washing with a capacity of 20 tonnes per day was in an advanced stage of development.

The process know-how for the manufacture of gibberellic acid was released to Chemosyn Pvt. Ltd, Bombay, who are expected to complete their commercial-scale trials shortly.

Fuel cakes were made from blends consisting of pine needles, saw dust, rice husk, and rice straw without using an external binder and higher compressions. The fuel cakes with a density of 0.3 g/cm³ had calorific values of 4000-4400 kcal/kg.

The antiinflammatory and antiarthritic activity of the gum resin of *Boswellia serrata* (salai guggal) was established. Tests on its chronic toxicity in rabbits and monkeys showed no adverse change in haematological and biochemical parameters throughout the chronic feeding experiments. Gufic (Pvt.) Ltd, Bombay, are marketing the drug under the trade name 'Sallaki'.

The role of *Woodfordia fruticosa* flowers in the production of Ayurvedic fermented products such as *asavas* and *aristas* was studied under a consultancy assignment awarded by Rahul Pharma, Jammu. On the basis of information provided by the laboratory the party has set up a plant in Jammu.

The know-how for isolation of ajmalicine, an important hypotensive alkaloid from *Lochnera rosea* (syn. *Vinca rosea*) roots, was released to a pharmaceuticals firm in Amritsar. The

antiasthmatic principle quercetin was identified for the first time in *Allium cepa* (Red Multiplier). A process for the production of quercetin from rutin was developed.

Hops worth Rs 10 million were produced in the Kashmir Valley during 1981 with the agrotechnology back-up of the laboratory. 'Aroma hops varieties have also been introduced in the valley by the Srinagar branch laboratory. The mushroom production in the valley based on the laboratory's know-how was worth Rs 12 lakh in 1981. The agrotechnology and spawn for growing Dhingri (*Pleurotus flabellatus*) was also released.

Agronomical studies were continued on Chlocimum (*Ocimum gratissimum*) and Jamrosa (RRL-82). Their oils have already been accepted by the industry and there was great demand for propagating material of the plants.

CSIO Annual Report: 1980-81

One of the major achievements of Central Scientific Instruments Organisation (CSIO), Chandigarh, according to its annual report for 1980-81, was the development of know-how, based on replication process, for the fabrication of Fresnel lens master. Fresnel lenses moulded from this master, meant for use as solar energy concentrators, on testing at Central Electronics Engineering Research Institute, Pilani, were found to be comparable with the imported ones. The technology developed is viable functionally as well as economically. Other important instruments/products developed by CSIO during the year are: electronic flow monitoring and control system, cardiocograph, non-fade ECG monitor, photocopying machine objectives, aerial camera, and ultrasonic hardness tester.

The electronic system for measuring, monitoring and controlling the flow of liquid through eight different fermentors in a pharmaceutical plant was designed, developed and fabricated

under the sponsorship of Pfizer Ltd, Chandigarh. Making use of the scanning technique and integrated circuits, this system would help improve the production efficiency and reduce production cost. The prototype after evaluation under simulated conditions has been shifted to the firm's plant at Chandigarh for installation.

The cardiocograph is a sophisticated electronic instrument extremely useful for applications in obstetrics and gynaecology for monitoring the foetal heart rate and labour activity. The heart rate is derived from the ultrasonic Doppler shift and the labour activity from the strain gauge transducer. The instrument can monitor the progress of pregnancy from the tenth week onwards. After its successful clinical trials at Postgraduate Institute of Medical Research and Education, Chandigarh, the know-how has been transferred to National Research Development Corporation of India (NRDC). Also assigned to NRDC was the know-how of a portable cardiac monitor, called minicardioscope, also developed during the year. This instrument has a new cordless battery-operated electrocardioscope integral with electrodes for direct application on patient's chest and gives an immediate idea of cardiac emergencies.

The non-fade ECG monitor developed by CSIO gives a non-fading continuous display of ECG and gets round the difficulties experienced with conventional bouncing ball CRT displays. It is extremely useful in coronary care units, intensive care units and emergency wards for continuous monitoring of patients over long periods.

Photocopying machine objectives of 145, 180 and 210 mm f/5 were designed and developed. CSIO also completed the development of a prototype of an aerial camera. Static trials with the camera gave good photographs.

The ultrasonic hardness tester developed is a low-load direct reading portable instrument and employs a

mechanical-electronic method of testing the surface hardness of machined or smooth surface steel. Its know-how has been assigned to NRDC.

Among the other instruments and devices at various stages of development are: (i) a prototype of 25 MHz universal pulse generator—a multifunction test instrument for testing digital instruments, circuits and multi-input devices; (ii) a prototype of a portable digital grain moisture meter; (iii) an electronic control and monitoring unit for dialysis machine; (iv) a vasc apparatus for electrocoagulation in vasectomy operations; and (v) a galvo scale projector, a sensitive optical projection instrument for measurement of small dc signals.

In a project concerning the development of optical components and holographic techniques, progress was made in the development of the laboratory specimen of holospherical lenses, realization of experimental bench set-up of a laser speckle camera, and a laboratory demonstration set-up of a laser communication kit. In applied physics, the improvement of the performance of the scanning electron microscope was a notable piece of work. An atomic absorption spectrophotometer was under development.

The laboratory paid considerable attention to the development of instruments based on fibre optics, viz. otoscope, nasopharyngoscope, placetoscope, clinical headlamp, and others.

CSIO established a new division on Environmental Pollution Monitoring Instruments in view of the growing importance of preventing environmental pollution. Projects under the purview of this division include development of a water turbidity monitor, an automobile smoke density monitor, a dust particle counter, and a portable sulphur dioxide monitor.

The laboratory continued to assist industry, educational institutions and government establishments by providing testing, calibration, and repair and maintenance services. Training of scientific and technical personnel also

formed an important activity. It earned a revenue of about Rs 2 lakh by rendering technical assistance to outside parties.

* RRL-Trivandrum * Annual Report: 1981

Twenty R&D projects spread over four disciplines, viz. Food, Materials, Science and Technology Planning, and Environmental Engineering, were under investigation during 1981 at Regional Research Laboratory (RRL), Trivandrum, according to the laboratory's annual report for that year. The main objective of the laboratory has been the utilization of the natural and mineral resources of the region in a most judicious way.

Considering the export potential of white pepper powder the laboratory investigated its production by grinding black pepper and separating the residual black skins. Through the process developed the white part of black pepper can be marketed as white powder and the black portion can be used for extraction of pepper oil and pepper oleoresin.

A process for bottling ripe coconut water was developed with a view to utilizing an estimated 270 million litres of coconut water available from copra-making units in the state. In the process, ripe coconut water is upgraded to the level of tender coconut water and made preservable through heat treatment and addition of permitted additives under stipulated conditions and bottled. The bottled coconut water preserves very well for up to two months at ambient temperature.

Laboratory-scale studies carried out to prepare oleoresins with fresh flavour from pepper and chilli showed that the oleoresin obtained from sun-dried pepper had characteristics closer to fresh pepper's and hence was a preferred product. As for chilli, the preferred product was the blended sample of the hexane extract of the pressed-out juice of the fresh, disintegrated chilli and the extract of dried residue. In another

study aimed at retaining the flavour of curry leaves it was observed that the forced draught drying of the leaves at 55°-60°C in an electrical cross-flow drier could give the most acceptable product.

The laboratory prepared laminates using coir (11% by wt) and banana-cotton fabric (9% by wt) and polyester resin. The consumer products based on these laminates did not show any deterioration even after weathering for a year.

Utilization of coconut pith and shell powder was investigated in the extraction of metals, biogas generation and foundry technology. Optimum conditions were determined for obtaining briquettes from pith and shell powder. A simple foundry technique was developed for producing Al-11 Si (LM₆) alloy containing up to 40% (by vol.) coconut shell char particle composite.

Light-weight bricks were prepared with coconut pith/shell powder/sawdust and rice husk ash in various proportions and in combination with Cannanore clays and fire clays. It was found that bricks made with pith of mesh size between -16 and +30 showed poor properties—low strength and high porosity, while bricks made with pith size above 30 mesh yielded better results.

A few compositions for stoneware pipes were successfully tried both on a laboratory scale and on a factory scale (Travancore Potteries, Quilon). Also, successful attempts were made to prepare low-fired porcelain bodies by using common clays. The characteristics like density, strength, modulus of rupture and electrical properties of the porcelain bodies show that the latter could replace the traditional triaxial porcelain bodies fired at higher temperatures.

A new dental restorative material developed by using the locally available quartz and acrylic resin showed no side effects in trials on dogs but its adhesiveness in the presence of water needed improvement. Accordingly the

material was modified and the modified sample was found to be satisfactory.

The laboratory continued its studies on developing new uses of refractory oxides and non-metallic materials. By using a simple foundry technique developed in the laboratory, fine powders (40 μm) of zirconia particles were dispersed up to 50 wt% in Al-Mg melts and fine powders of TiO_2 and ZrO_2 were dispersed in Al-11 Si-1 Mg alloy and the composites were cast into different shapes and sizes. Addition of zircon in Al Si-Mg alloy increased hardness but decreased other mechanical properties. Interface interaction of ceramic particles with molten Al alloys promoted the wetting characteristics.

Field trials on about 300 water taps cast by using Al-Zr composites were under way. These are expected to replace water taps made out of the expensive Al-Cu alloy.

The know-how on dry-packed green pepper was released to two parties. The technologies concerning partially defatted coconut gratings and fractionation of chilli oleoresin were released to three more parties. Technologies developed during 1981 and awaiting commercial exploitation relate to: (i) bottling of coconut water, and (ii) white pepper powder from black pepper, berries.

As well as bringing out a monograph on 'Materials science and technology in the future of Kerala', the laboratory published 31 papers. It rendered consultancy services to a private industry on improving the production of spice oleoresins and spice oils. □

CEERI Extension Centre Annual Report: 1981-82

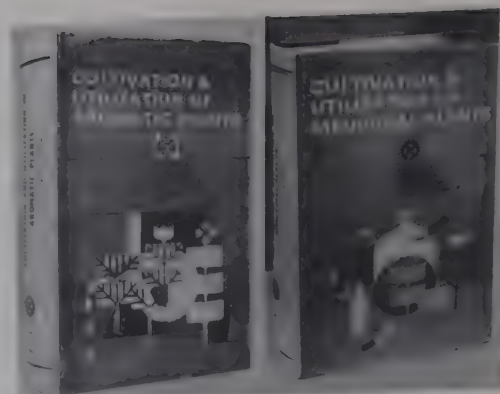
The annual report (mimeographed) of the Central Electronics Engineering Research Institute's extension centre at Madras for 1981-82, brought out recently, shows that the centre's R&D activities were concentrated in the areas of process quality control instrumentation and industrial electronics. The centre finalized the release to National

Research Development Corporation of India of know-how relating to: rapid carbon analyzer, non-destructive vacuum measuring system, and automatic measurement of resistance of battery separators. Work was started on the building up of a microprocessor laboratory facility which would ultimately help develop microprocessor-based control aids for the paper and pulp industry. Also started was the work on the development of on-line pollution monitoring instrumentation as part of a CSIR Complex inter-laboratory project. The first phase of the work on the design and development of a corrosion meter was successfully completed in collaboration with the Central Electrochemical Research Institute, Madras unit. The centre conducted a survey to assess the needs of instrumentation in plywood and wood-based industries and ball-bearing industry. □

RRL-Jammu brings out two companion volumes on medicinal and aromatic plants

The Regional Research Laboratory (RRL), Jammu, has recently brought out two publications: (i) *Cultivation and Utilization of Medicinal Plants* (874 pages) and (ii) *Cultivation and Utilization of Aromatic Plants* (816 pages). These are bifurcated volumes of the earlier publication *Cultivation and Utilization of Medicinal and Aromatic Plants* (1977), which has been revised, updated and enlarged, the editors being C.K. Atal and B.M. Kapur. Wide ranging in scope and treatment, the two volumes would be of interest to a great many specialists like economic botanists, ethnobotanists, phytochemists, pharmacognosists, agronomists, chemical engineers, and practitioners of indigenous systems of medicine, besides cultivators and traders.

Each of the volumes is priced at Rs 100 (in India), \$ 35 or £ 15 (abroad). Discounts permissible are: 10% for a set of both volumes; 20% for 5-20 copies; and 30% for more than 20 copies.



Money orders/bank drafts on any of the banks in Jammu should be drawn in favour of: The Administrative Officer, Regional Research Laboratory, Jammu-Tawi 180001. □

Preprocessor for Engineering Software Program Packages

For large program packages used in engineering analysis an enormous amount of formatted data is required, and its preparation becomes a drudgery. Despite care taken in checking and rechecking and despite the availability of internal data generation facilities, there occur errors in results because of formatting errors. To some extent this problem has been overcome by scientists working at Structural Engineering Research Centre (SERC), Roorkee, who have designed a preprocessor for engineering software programs. A feature of the preprocessor's design is that it accepts data in a form free of any format specifications and generates output in a given form. It also allows leading, trailing and/or embedded blanks and/or CTRL/L in a data line, horizontal and vertical repetition of data entries, comment data lines, data group identification, and tab setting. The preprocessor can be used for formatting data for engineering program packages like COMPLEX and NONSOLID, the sole limitation being a record-by-record compatibility of contents with the formatted output.

The preprocessor is written in the macro-language on the DEC-2050 system. Efforts are however being made

to convert it into a FORTRAN IV machine-independent version.

More details of the preprocessor are contained in a booklet (author: Sarita Jain) brought out by SERC. Copies of the publication are available from Dr S.P. Sharma, Scientist in charge, SERC, Roorkee 247 672. □

CONFERENCE BRIEFS

Workshop on Essential Oils, Spices and Pigments

Dr Akhtar Husain, Director, Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, visited Philippines from 23 August to 3 September 1982 to participate and act as an RCTT expert in the National Workshop on Essential Oils, Spices and Pigments, held in Manila. Dr Husain presented two papers at the workshop: (i) Current status of production and utilization of essential oils in India, and (ii) Use of village-level technology for production of essential oils in India. He also held discussions with scientists and technologists on the problems discussed in the workshop with a view to organizing an R&D technology transfer programme in essential oils. While in Philippines, Dr Husain also visited several research institutions and held detailed discussions with research workers. □

PERSONNEL NEWS

Appointments/Promotions

Dr Y.V. Ramana

Dr Y.V. Ramana, Scientist C, of National Geophysical Research Institute (NGRI), Hyderabad, has been promoted, on assessment, as Scientist EI (7 April 1982).

A B.Sc., an M.Sc. in physics (electronics) and a Grad.I.T.E., he earned Ph.D. from Osmania University for his work on ultrasonic techniques to study rocks and their elastic properties. Joining NGRI as a senior research fellow in 1964, he was appointed Scientist B in 1965. He worked for about a year at Sheffield University, UK, on rock mechanics. Returning to NGRI in

1966, he specialized in the study of the behaviour of rocks under high pressures and developed the first indigenous 5 kb high-pressure apparatus. He has established a full-fledged high-pressure and rock mechanics laboratory at NGRI. With more than 30 innovations and many patents to his credit, he has published more than 70 papers. His work has found wide applications, as, for example, in subsurface mining and dam site evaluations. He is a fellow of the Acoustical Society of India, Indian Geophysical Union, Geological Society of India and Indian Geoscience Association, and a member of the Association of Exploration Geophysicists, India.

* * *
Dr D. Atchuta Rao

Dr D. Atchuta Rao, Scientist C, of National Geophysical Research Institute, Hyderabad, has been appointed on promotion Scientist EI (23 Aug. 1982).

Born 15 May 1939, Atchuta Rao took his M.Sc. (Tech.) degree in geophysics in 1962 and Ph.D. in 1974, both from Andhra University, Waltair. After working briefly at Tata Institute of Fundamental Research, Bombay, he moved to NGRI in 1963. A member of the group engaged in the development and establishment of a multiparameter airborne geophysical survey facility at NGRI, he successfully carried out the first experimental airborne geophysical survey over Kudremukh region in Karnataka and subsequently a number of airborne surveys for mineral and oil exploration. He is currently project leader of a major airborne survey programme undertaken by NGRI for Geological Survey of India. During 1974-76 he was at University of Adelaide, South Australia, and worked under a Colombo Plan fellowship on the interpretation of airborne geophysical survey data over Broken Hill District of New South Wales and Hamersley iron ore province of Western Australia.

Dr Rao is the course coordinator for NGRI's training courses on methods

and techniques in exploration geophysics sponsored by Unesco, COSTED and CSIR. Dr Rao has more than 30 publications and 15 technical reports to his credit. He is a fellow of Indian Geophysical Union, of Geological Society of India, and an active member of Society of Exploration Geophysicists (USA), and of Association of Exploration Geophysicists India.

* * *

At Regional Research Laboratory (RRL), Jammu, the following have been appointed as Scientist B: Dr S. Mukhoupodhaya (16 Aug. 1982), Smt Geeta Handa (18 Aug. 1982), Dr Rajinder Prashad (18 Aug. 1982), Shri Krishna Raj (3 Sep. 1982), Dr (Kum.) Sudesh Malhotra (13 Sep. 1982), Dr Mohammad Ali (16 Sep. 1982), Shri Suresh Chander (17 Sep. 1982), and Dr G.S. Pahwa (17 Sep. 1982).

The following have been appointed on promotion as Scientist B: Kum. Sushma Kaul (18 Aug. 1982), Shri Gandhi Ram (18 Aug. 1982) and Dr S.K. Bakshi (23 Sep. 1982). Promotions to the position Scientist B consequent upon assessment include those of: Dr Surinder Kaul, Dr K.A. Suri, Shri V.S. Gandotra, Dr S.K. Choudhary, Shri R.P. Singh, Shri G.S. Gaur, Shri Charan Singh, Shri R.N. Padita, Shri Swadesh Paul, Shri B.L. Bradu, Shri S.S. Balyan, Dr G.K. Gupta, Dr V. George, Shri S.D. Sharma, Shri Ramesh Kapoor, Dr J.L. Suri, Dr V.K. Sethi, Shri Jeet Singh, Dr B.D. Gupta, Shri R.P. Sood, and Dr S.M. Anand (all with effect from 1 Feb. 1982). Also promoted, consequent upon assessment, at this laboratory, are: Dr S.N. Khosla (Scientist C, 12 Jan. 1982), Shri D.V. Rawal (Library Officer B, 1 Feb. 1982), Shri S.K. Kapoor (Scientist A, 1 Feb. 1981), Smt B.L. Narasimma (Scientist A, 1 Feb. 1981), Dr P.N. Jotshi (Scientist A, 16 June 1981), and Shri B.K. Kapahi (Scientist A, 26 Aug. 1981).

Retirements

Shri G.G. Sarkar

Shri Gour Gopal Sarkar, Distinguished Scientist, Central Fuel Research Insti-

tute, Dhanbad, retired on 31 July 1982, on attaining the age of superannuation. Shri Sarkar is a well-known coal scientist whose pioneering work and



contributions in the development of technology of coal preparation have earned him international fame. His work on demineralization of coal by oil agglomeration won him and his team-mates the National Research Development Corporation of India's Republic Day Award (1982) of Rs 25,000. For a brief profile of Shri Sarkar see *CN*, 32 (1982), 17 & 37. □

CSIR Patents Unit shifted

The CSIR Patents Unit, located at CSIR Complex, NPL Campus, Pusa, Library Road, New Delhi 110012, has been shifted to No. 20, Ring Road, Lajpat Nagar, New Delhi 110024, effective 1 November 1982. All communications may now be addressed to Joint Adviser (Patents) at the latter address. □

PATENTS FILED

223/Del/82: An improved process for the preparation of *m*-nitroaniline from *m*-dinitrobenzene by catalytic hydrogenation, Smt. Aziz Mirza & R. Vaidyeswaran—Regional Research Laboratory, Hyderabad.

224/Del/82: An improved process for the preparation of 4-terpineol, K.N. Gurudutt & B. Ravindranath—Central Food Technological Research Institute, Mysore.

254/Del/82: An improved process for the preparation of 4-terpineol, B. Ravindranath & P. Srinivas—Central Food Technological Research Institute, Mysore.

478/Del/82: A process for the preparation of stable manganous oxide, M.N. Murthy, S. Murthy, C.E. Despande, P.P. Bakare & Jyotsna Jayant Shrotri—National Chemical Laboratory, Pune.

378/Del/82: A process for the recovery of lead and zinc value from mor cake, P.K. Sahoo, S.C. Das & P.K. Jena—Regional Research Laboratory, Bhubaneswar. □

ANNOUNCEMENTS

International Symposium on Beacon Studies of the Earth's Environment

At National Physical Laboratory (NPL), New Delhi, will be held the above symposium from 3 to 11 February 1983. Preceding the symposium is a workshop on Beacon Techniques and Applications on 3-4 February 1983.

The symposium is sponsored, besides CSIR (NPL), by International Union of Radio Science (URSI), Commonwealth Science Council, Unesco, Committee on Science and Technology in Developing Countries, Indian National Science Academy, Department of Science and Technology, and Indian Space Research Organisation.

Topics which the symposium will cover will be interdisciplinary and include: low-altitude ionosphere/magnetosphere system; multi-technique investigations which involve radio beacons with emphasis on the high-latitude ionosphere/magnetosphere system; ionospheric modification by artificial heating or chemical releases and radio beacons as an important tool to monitor the modifications; beacon studies on natural disturbances like eclipse effects and magnetic storms; beacon studies of solar-terrestrial relations; and beacon studies and advanced radio systems.

Further details obtainable from the symposium convener Dr A.P. Mitra, Director, NPL, and workshop convener Dr T.R. Tyagi, Scientist, NPL, New Delhi 110012. □

Frontier Technologies in the Third World

A seminar on 'Frontier Technologies in the Third World: Towards a Strategy of Self-reliance' is being organized by the National Institute of Science, Technology and Development Studies, New Delhi. To be held from 15 to 18 December 1982 at CSIR Science Centre, New Delhi, the seminar has on its agenda a smörgasbord of issues to be considered for assessing frontier technologies. These include, for instance, (i) nature of technology itself, such as scope of application of technological breakthroughs occurring at global level, their economic characteristics and social origins; (ii) issues involved in the use of new technologies in developed as well as developing countries; (iii) relevance and significance of frontier technologies; (iv) international regulations, and (v) strategy for achieving self-reliance in frontier technology.

Contact person: Prof. A. Rahman, Director, National Institute of Science, Technology and Development Studies, NPL campus, New Delhi 110012. □

ERRATUM

Seminar on Cooperation in Information Management

In the announcement concerning the above seminar published in *CN*, 32 (1982), 160, the dates of holding the seminar should be 17-18 January 1983. The printing mistake in the year (given as 1982) is regretted. □

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

CSIR Advt. No. 48/82

The Council proposes to appoint two Scientists F (scale of pay Rs 2000-125/2-2500) in National Chemical Laboratory, Pune.

One of the posts (Post I) is in physical organic chemistry. The other (Post II) is an R&D management position to look after NCL's technical services, etc. Further details about the posts and prescribed pro forma for sending the curriculum vitae are obtainable from Joint Secretary (Administration) CSIR, Rafi Marg, New Delhi 110001. Deadline for receipt of applications at CSIR Headquarters is 20 December 1982. □



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

NCL-ICMA Get-together

A get-together of scientists and representatives of chemical industry held at National Chemical Laboratory (NCL), Pune, on 8 October 1982 provided an opportunity for both sides to appreciate each other's problems and to arrive at some understanding. Organized jointly by NCL and the Indian Chemical Manufacturers' Association (ICMA), the get-together was attended by more than 250 participants including executives, and R&D and production managers. The men from industry availed themselves of the opportunity to get to know NCL's R&D programmes and facilities available to tackle industries' problems. Reassuring to industry was the fact that the needs of small-scale industries, like those of the middle-scale and large-scale industries, were also kept in view by NCL.

In his address, Dr L.K. Doraiswamy, NCL's Director, gave a comprehensive account of the laboratory's ever-expanding scope and of its record in meeting the needs of the industry through cooperative efforts. He also emphasized that, it being a national laboratory, NCL had an equally challenging task of setting standards in academic research. Government expected NCL to be involved in long-range research in areas identified by several high-level S&T committees, and the industry, on its part, would like this chemical laboratory to be involved in developing processes of more immediate relevance to them. Lately, small-scale industries, which had also started seeking NCL's expertise, had desired

that this national laboratory should not confine its scope to medium and large industries or long-range projects only but extend it to serve small industries also, added Dr Doraiswamy. Continuing, the NCL Director said that the laboratory had maintained excellent relations with both public and private sector organizations. NCL would like to associate itself with any sector of industry to transform its R&D results into realities, he emphasized.

The ICMA President, Shri M.B. Mehta, said that acquiring latest technologies from developed countries was not easy. In order to bridge the technological gap it was imperative to evolve a strategy for development of newer and better technologies for producing cheaper and better products. In this context, NCL with its expertise and excellent infrastructure facilities could fruitfully collaborate with ICMA in developing the much-needed technologies for the Indian chemical industry, Shri Mehta added.

The NCL Director and his senior colleagues then presented the laboratory's R&D programmes and methodologies, which are summarized in the following paragraphs.

Dr A.V. Rama Rao pointed out that the laboratory laid emphasis on the synthesis of well-established drugs which were not made in the country, for example chloroquine and vitamin B₆. NCL had adopted a new approach of building dihydroquinolone first and then condensing it with novaldiamine to obtain chloroquine. As a result, the price of the raw material worked out to be 60% of that used in the conventional process. Similarly it had developed the anti-asthmatic drug salbutamol by a

totally innovative method. The laboratory was currently engaged in developing processes for adriamycin and its analogues. In regard to agrochemicals, Dr Rao made a mention of NCL's crop of processes and products which had been commercialized: insecticides, weedicides, fungicides, and plant growth regulators. A recent achievement was the development of Indothrin, a new pyrethroid. Other programmes were concerned with synthetic dyes and polymers.

Sophisticated instrumentation facilities available at NCL were referred to by Dr A.P.B. Sinha.

Dr Paul Ratnasamy spoke of the laboratory's work on catalytic process development. Besides developing catalysts of immediate relevance to the Indian chemical industry, the laboratory was making efforts to develop catalysts needed in the industrially advanced countries of the West with a view to exporting such technologies.

NCL's efforts to improve plant productivity through simulation and modelling were dealt with by Dr A. Bhattacharya, and improvements that could be made in polymer processing through rheology and modelling, by Dr A.V. Shenoy.

Shri D.M. Trivedi, Chief Executive of National Rayon Corporation Ltd,

Inside

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Bombay, referred to the nitrile rubber technology jointly developed by NCL and Synthetics and Chemicals Ltd, Bareilly. Shri K.C. Shroff, Joint Managing Director, Excel Industries Ltd, Bombay, appreciated NCL's efforts to help small-scale entrepreneurs and felt that there should be a close link between NCL and ICMA for this purpose.

The participants were taken round the laboratory with a view to apprising them of the on-going projects. □

Measurement of riding quality of roads

A scheme for developing comprehensive data on the level of surface finish and quality control obtained for different layers under different conditions is to be implemented by Central Road Research Institute, New Delhi. The proposed scheme, sanctioned by the Union Ministry of Shipping and Transport, envisages collection of field data from about 100 different road construction sites so as to have a fair coverage with regard to: road category, degree of quality control, construction methods, materials of construction, etc. The data will enable the updating of the existing norms for surface evenness so that maximum advantage is taken of construction capabilities in reducing energy consumption during transportation by road. □

Active control flow facility established at NAL

An open-circuit 1.2 m × 1.2 m subsonic active control flow facility has been established at National Aeronautical Laboratory (NAL), Bangalore. This facility, designed and built by NAL, will be used to study and predict stability and control characteristics of advanced aircraft configurations. Unlike conventional wind-tunnel testing, wherein the model is rigidly fixed to a support system and aerodynamic forces and

moments are measured, in the active control facility an inertially scaled aircraft model is allowed to fly freely in the tunnel in a suspension cage with limited degree-of-freedom (two to five).

The advantages of such a model dynamic testing technique are: (1) Stability and control characteristics can be predicted by measuring model motions; (2) Unsteady aerodynamic phenomena can be realistically studied; and (3) Control system parameters optimized in wind-tunnel studies can be directly scaled to full-scale aircraft values by invoking laws of similitude.

Preliminary experiments to establish the concept of dynamic simulation are under way by using a scaled model of a transport aircraft flying in a two-degree-of-freedom suspension. □

Mode shape analyzer

Microprocessors are fast intruding into various engineering fields, dispensing with the much laborious off-line engineering calculations to obtain results. They can integrate/differentiate given data, filter, find the Fourier transformation and Laplace transformation, perform matrix operation, and so forth. This has made possible on-line processing of engineering data. In essence, a microprocessor performs like a minicomputer for on-line data-processing at a much cheaper cost.

One such application envisaged and applied in structural engineering is the 'mode shape analyzer' at National Aeronautical Laboratory (NAL), Bangalore. This analyzer has been applied to study the mode shapes of helicopter rotor blades under rotating conditions. It works basically on the principle of integrating elastic bending strains twice over the length of the beam with appropriate boundary conditions. This method of obtaining mode shape is found to be more effective and cheaper than by other conventional methods. The instrument can be employed effectively to detect mode shapes in actual flight conditions also. □

Plant response to sulphur dioxide and hydrogen fluoride pollutants

Sulphur dioxide and hydrogen fluoride emitted from several industrial sources affect plant life in various ways. Although a great deal of information on plant responses to these two pollutants, present singly, is available, their effect in combination is not well understood. To throw light on this aspect, Shri H.C. Sharma of National Environmental Engineering Research Institute, Nagpur, has investigated the effect of SO₂ and HF, both singly and in combination, on certain plants. Crop plants of economic importance, namely a legume (*Phaseolus aureus*), a cereal (*Triticum aestivum*), and an oil-yielding plant (*Brassica juncea*), were used for the study.

Different sets of these plants species, raised in plots, were exposed in a dynamic system to (i) SO₂ (0.25 and 0.50 ppm), (ii) HF (10 and 20 ppb), (iii) SO₂ (0.25 ppm) + HF (10 ppb), and (iv) SO₂ (0.5 ppm) + HF (20 ppb). Furthermore, the pollutant-exposed plants (cereal and oil-yielding) were sprayed with 1% ascorbic acid (AA) solution once in 10 days to test its efficacy as an antidote and its potential as a growth ameliorating vis-a-vis mitigating agent to counter the phytotoxic effects of the pollutants.

In legume plants, foliar injury symptoms were characteristic of SO₂ or HF for individual pollutants and of HF for the combined exposure, the injury ranging from 10.2 to 54.7%. The decrease in chlorophyll contents ranged from 9.0 to 29.5% in combined exposure. The seeds produced by pollutant-exposed plants were inferior both in quality and in quantity.

The foliar injury reduction in the cereal plants exposed to pollutants followed by spraying with AA ranged from 2.5 to 4.2%. The chlorophyll losses were maximally reduced in the pollutant-exposed plants (iii) followed by AA treatment. The energy and carbohydrate reserves of the grains

produced by AA-sprayed, pollutant-exposed plants were higher than those of the control group.

The oil-yielding plants were not affected to any significant extent, the injuries being mostly physiological. The seeds produced by pollutant-exposed, AA-treated plants were superior to those of the respective control. However, the oil yield was maximally decreased by 30.8% in variously treated plants.

In legume plants, the phytotoxic effects were, pollutant-wise, in the order: 10-ppb HF < 0.25 ppm SO₂ + 10 ppb HF < 20 ppb HF < 0.5 ppm SO₂ + 20 ppb HF < 0.5 ppm SO₂. The level of amelioration by AA on pollutant-exposed cereal plants, pollutant-wise, were as: 0.5 ppm SO₂ + 20 ppb HF < 20 ppb HF < 0.25 ppm SO₂ + 10 ppb HF < 0.5 ppm SO₂.

Shri Sharma, who worked under the guidance of Dr D.N. Rao of the Department of Botany of Banaras Hindu University, was awarded Ph.D. degree for his thesis based on the study. □

PROGRESS REPORTS

CECRI Annual Report: 1981-82

Calcium halophosphate daylight phosphor, lithium metal, black nickel electroplating, and self-regulating high-speed (SRHS) chrome salt are among the processes and products developed by the Central Electrochemical Research Institute (CECRI), Karaikudi, during 1981-82, according to its annual report for the period. The advantage of the laboratory's process for the daylight phosphor is that good phosphors can be prepared even without the use of a special inert atmosphere. The process for lithium metal production entails fused-salt electrolysis in a 500 A cell with graphite anodes and mild steel cathodes at a current efficiency of 58%. The SRHS chrome salt offers a considerably high rate of deposition of chromium with high microhardness and with ease of control and maintenance of bath.

Another important piece of work, the report shows, was the designing of a new modular cell (8 kg) for producing electrolytic magnesium. The cell has a low energy consumption of 14-15 kWh/kg as against 22-25 kWh/kg in conventional methods. Also, a two-step process was evolved for the production of completely anhydrous magnesium chloride. The process consists in briquetting spray-dried magnesium chloride and drying it in a current of chlorine gas obtained from the electrolytic cell under controlled conditions. Absence of water in the cell fuel considerably reduces the anode consumption.

A 96 V, 300 Ah power-pack (5 hr rate) was fabricated by the laboratory. Fitted on board a vehicle (at Vehicles Research and Development Establishment, Ahmednagar), it could run the vehicle for a distance of 65 km at a speed of 40-45 km/hr. The energy density of the power-pack worked out to 31 Wh/kg.

For preventing corrosion of steel in the cooling water in heat exchangers/condensers, non-chromate and low-chromate corrosion inhibitors were developed. The requirement of such inhibitors is estimated to run into crores of rupees worth.

The laboratory also developed a coulometric method for quick determination of corrosion rates of metals in high-resistant aqueous media. An equipment was designed and fabricated for facilitating such studies.

A method for making cupric, silver and chloride ion-sensitive electrodes was developed. These are used in water analysis, pollution control and effluent monitoring, and their working depends on the potential response of the membrane contained in them to the concentration of the species in solution. The method consists in preparing non-porous membrane discs of suitable diameter and thickness from the active materials. The active material is then compressed under vacuum at a high pressure and the resulting membranes are assembled as electrodes in suitable

plastic bodies after proper electrical contacts to the membrane are provided. These electrodes offer a simple and direct method to monitor ions at ppm levels.

For producing magnesium fluo-germanate phosphor, used in the manufacture of fluorescent tube lights emitting red colour, CECRI developed a process. It consists in mixing magnesium oxide, germanium dioxide, ammonium fluoride, manganese nitrate or manganese chloride and drying and heating the mixture in a silica crucible to a temperature of 1100-1300°C. The heated product is air-quenched, ground, reheated to 1100-1300°C, and air-quenched again, ground to fine powder, and sieved to obtain a product of desired particle size.

The laboratory developed a process for producing anodized aluminium pieces, which find decorative, architectural and functional applications, by employing alternating current in place of direct current used in the conventional methods. As a result, the additional investment on rectifiers used for converting ac into dc is saved. Besides, large currents can be employed unlike in the dc anodizing process.

An impedance measuring unit was set up and its performance tested by using analog circuits. It was employed for studying the mechanism of inhibition of metals and different acids containing inhibitors. These studies offer scope for the development of a corrosion rate meter which can be used for measuring *in situ* corrosion rates in chemical, fertilizer and petroleum industries.

An apparatus for measuring the vapour pressure of organic compounds by Kundsén method was set up with a view to determining their corrosion inhibition properties.

The laboratory acted as consultants to National Research Development Corporation of India for setting up a 380 kVA arc furnace for the production of calcium carbide at Central Research Organisation, Rangoon, under the Indian Technical and Economic

Cooperation Programme. CECRI set up the furnace to the satisfaction of the Burmese government and trained the concerned personnel.

Twenty-one papers, including six reviews, were published, and 40 patents were filed. □

Food Animals as Indicators of Air Pollution

The health status of food animals living in the vicinity of industrial and mining regions could be a good index of the deleterious effects of particulate air pollutants on humans. Surveys conducted in such areas have shown high concentrations of deposits of inorganic particulate matter in the lungs and regional lymph nodes of domestic animal population, the extent of deposits increasing with the age of animals. Dust samples from the lungs and lymph nodes revealed the presence of iron, copper, zinc, and mercury in appreciable quantities. This observation reinforces the need for environmental monitoring in mining and industrial areas through animal populations. The study has also brought to light the need for greater awareness of the possibility of metal intoxication in human beings since the animals studied come in their food chain. The findings also underline the need for longitudinal surveys in animals as well as environmental air sampling together with analysis.

The studies, made during 1976-80 on about 8000 animals (bovine, caprine and ovine species) from mining and industrial areas of several states, were carried out by Industrial Toxicology Research Centre, Lucknow, in collaboration with Indian Institute of Technology, Kanpur, and Bhabha Atomic Research Centre, Bombay, under a scheme sponsored by the Department of Science and Technology.

The report of the survey titled *Food Animals as Indicators of Air Pollution* has just been released by ITRC. Copies of the publication (36 pages, unpriced) are available from: The Director, ITRC,

P.O. Box 80, M.G. Marg, Lucknow 226 001. □

Geophysical Research Bulletin: Special Issue Dedicated to Dr Hari Narain

The September 1982 (Vol. 20, No. 3) of *Geophysical Research Bulletin*, a quarterly being published by National Geophysical Research Institute (NGRI), Hyderabad, has been devoted to Dr Hari Narain, NGRI's Director. This number (414 pages) includes specially invited papers from NGRI's scientists who have made significant contributions in their fields. Twenty-six papers in various areas of geophysical research document the progress of NGRI's R&D work over the past 20 years since the laboratory was established.

Also included in the September number is an appreciation (by M.B. Ramachandra Rao) of Dr Hari Narain, who completed 60 years in that month. □

Toxicity of Fenitrothion

In the series 'Toxicology Data Sheets on Chemicals', being brought out by Industrial Toxicology Research Centre (ITRC), Lucknow, the latest (seventh) concerns Fenitrothion, a contact insecticide effective particularly against rice stem borers. Contains 115 references. Copies (unpriced) available from: The Director, ITRC, P.O. Box 80, M.G. Marg, Lucknow 220 001. □

CONFERENCE BRIEFS

International Conference on Coordination Chemistry

Prof. M.M. Taqui Khan, Director, Central Salt & Marine Chemicals Research Institute, Bhavnagar, participated in the 22nd International Conference on Coordination Chemistry, held at Budapest, 23-27 August 1982. His report: Recent trends discussed in group discussions of selected posters related to magnetic

interactions, amino acids and derivatives, dioxygen complexes, nucleic acids and derivatives, antitumour complexes, catalytic hydrogenation and cyclopentadiene complexes, with over 30 papers on each of the first two topics. The discussions focused attention on unsolved problems in the fields.

Posters were also presented in other topics like antibiotics; carbohydrates; vitamins and fungitoxics; enzymes; theoretical aspects; X-ray structure; organometallic complexes; dimeric, oligomeric compounds; and heavy donor atom complexes. There were 20 plenary lectures by experts from 14 countries including India. One of such lectures was from India by the CSMCRI director on 'Ruthenium dioxygen complexes'. Some of these complexes have stabilities in solution of the same order of magnitude as oxyhaemoglobin. The results are of far-reaching consequence since ruthenium belongs to the same family of elements in the Periodic Table as iron. Besides the well-known cobalt-oxygen carriers, the water-soluble complexes of ruthenium are the first known examples of oxygen carriers in aqueous solution.

The conference had a sizable participation from India, mostly due to the Indo-Hungarian Scientific Exchange Programme, observes Prof. Khan.

* * *

International Conference on Homogeneous Catalysis

Prof. Taqui Khan, who also attended the title conference (Milano, 30 Aug.-3 Sep. 1982), reports that the conference, third in the series, covered a wide spectrum of the applications of the science of homogeneous catalysis to a number of reactions and systems. There were eleven plenary lectures, eight microsymposia on topics of current interest in homogeneous catalysis including 36 presentations and 80 papers in four poster sessions. The number of papers presented and discussed was almost twice that presented in the second conference (Dusseldorf, 1980).

The microsymbiosia dealt with (i) Homogeneous photocatalysis of water splitting; (ii) Catalytic homogeneous oxidation with hydrogen peroxide or organic peroxides; (iii) Electron transfer catalysis in enzymes and synthetic catalysis; (iv) Homogeneous homologation with CO of alcohols, aldehydes, acids and their derivatives; (v) Homogeneous catalysis in the synthesis of fine chemicals, (vi) Kinetics and mechanism of homogeneous catalysis; (vii) Homogeneous catalysis in the synthesis of natural products; and (viii) Catalysis with clusters.

Homogeneous catalysis has entered in a big way the industrial processes and is expected to take many rapid strides in future in closing the gap between organic chemistry and inorganic chemistry, observes Prof. Khan.

* * *

Asia Pacific Metrology

Programme Review Meeting

Dr K. Chandra, head of the Standards Division of National Physical Laboratory (NPL), New Delhi, participated in the second review meeting of the Asia Pacific Metrology Programme (APMP) and the regional workshop on Metrology for Developing Countries, both held at the CSIRO Division of Applied Physics, Sydney, Australia, from 30 August to 10 September 1982. Other NPL scientists who participated in the workshop and the review meeting were Dr K.C. Joshi, Dr P.N. Puntambekar, and Shri Gurmej Ram. Dr Chandra's report:

Participants from 18 countries and several international and national organizations like Unesco, Commonwealth Science Council, Australian Development Assistance Bureau, and International Bureau of Weights and Measures (BIPM) took stock of the progress made under the programme. In the workshop, apart from five general and seven specific lectures on measurement areas, demonstrations relating to measurement in mass, length, temperature, dc, ac, force, pressure, density, and

high voltage were held. While measurement facilities at NPL-India were found to be on par with those at National Measurement Laboratory-Australia, the desirability of seeking assistance from the latter in training, consultancy and technical information in the following eight areas is indicated: (i) Density standards and related measurements, (ii) Calibration of measuring tapes using laser-interferometer techniques, (iii) Automation in calibration of temperature measuring devices, (iv) Automation in dc measurements based on 'Linde' potentiometer, (v) Automation in ac/dc transfer techniques for measurement of ac voltage, current and power and for calibration of voltage and current transformers, (vi) Optical radiometry and photometry, (vii) High voltage measurements, and (viii) Microwave impedance standards and calibration facilities.

At the APMP review meeting were presented for discussion eight documents dealing with the progress of APMP: roles of CSC and Unesco in APMP; reports on workshop on Metrology in Quality Assurance (Kuala Lumpur, 1982) and regional meeting of the working group on Metrology for South and Central Asia (New Delhi, 1982); and measures to augment metrology infrastructure in some countries.

The meeting recommended that a major effort was needed to ensure that all primary standards should have a valid calibration by the end of 1983. The report of the regional working group meeting on Metrology for South and Central Asia, which Dr Chandra presented, was well received at the review meeting, which endorsed the working group's recommendation that a project document be prepared for submission to UN agencies. Dr Chandra is one of the members of the group entrusted with the responsibility for preparing the project document. [See *CN*, 32(1982), 145-46 for a brief report of the regional working group meeting.]

The meeting also revealed that intercomparison of standards with respect to temperature and time & frequency had been completed and that work was in progress as regards acoustics, ac voltage, dc resistance, dc voltage (electronic reference), dc voltage (Transvolt), length, mass, and photometry.

As coordinator of the programme on intercomparison of dc voltage, Dr Chandra apprised the conferees that with 'Transvolt'—the travelling standard—the first phase of the intercomparison was expected to be completed by the year-end. China and Thailand were expected to join the intercomparison programme in the second phase. During 1983-84 intercomparisons would be taken up in respect of (i) ac resistance at 50 Hz and 1 kHz, (ii) capacitance (10 pF), (iii) mass (10 g), and (iv) microwave attenuation. Among the other recommendations of interest to India (NPL) are that India (i) should organize a workshop on Metrology for Trade and Industry in Developing Countries in 1983, and (ii) provide the next regional coordinator for the three-year term from October 1983. This honour is in recognition of India's—which in turn is NPL's—contribution to APMP, observes Dr Chandra. India (NPL) is also on the newly constituted steering committee.

* * *

International Association of Hydrologists Congress

Dr Sukumar Mallick of the CSIR's International Hydrological Programme Unit attended the 16th Congress of the International Association of Hydrologists (IAH) held at Prague, 5-11 September 1982. The congress was sponsored by the Czechoslovak government in cooperation with IAH, Unesco, UNEP, and a number of other organizations. Dr Mallick's report:

A major programme of the congress was the holding of an international symposium on Impact of Agricultural Activities on Groundwater. The other

programmes were: (i) a round-table discussion on the problem law in relation to groundwater protection from the impact of agricultural activities; (ii) a session of IAH; (iii) a session of the IAH commissions; (iv) a meeting of the chairmen of national committees of IAH; and (v) a plenary session of IAH. The CSIR scientist presented at one of the symposium sessions his paper entitled 'Prediction-cum-management alternative model for nitrogen pollution in shallow aquifer as a result of agricultural activities in Indo-Ganga plain'; in the application of the model, Meerut district (Uttar Pradesh) was taken as a case study. At the round-table discussion, status reports were presented by scientists from West Germany, UK, India, Ireland, USA, The Netherlands, and Denmark. A recommendation that emerged from the discussions was that an international commission under Unesco, UNEP, WHO be constituted on the subject with hydrologists, water resources engineers, agriculturists, doctors, and lawyers as members.

A monograph on groundwater protection is being prepared by an IAH commission to focus the problems and possible remedies and precautions necessary to protect this vital natural resource, observes Dr Mallick. □

EXTRAMURAL RESEARCH

Chemotherapy evaluation in treatment of recurrent and metastatic brain tumours

The last word is yet to be said about the most appropriate line of management of malign brain tumours. One of the treatments widely adopted is the use of cytotoxic drugs. The administration of drugs via the arterial route has been successfully tried for orofacial malignancy. However the same route of administration has been sparsely reported in the treatment of intracranial malignancy. A CSIR research fellow, Dr K. Subbiah, has in a study laid emphasis on the importance of intracarotid

administration of drugs in the treatment of recurrent and metastatic brain tumours. He carried out the investigations in the Department of Neurosurgery, Government Rajaji Hospital, Madurai, during 1978-81.

Of the 25 cases studied, 18 were recurrent glioma and the remaining 7 were metastatic brain tumours. Intra-arterial injection was given in 14 cases, intravenous in 9 cases, and intralesional in two cases. Most of the cases were treated with any two of the three cell-cycle specific agents: (i) methotrexate, (ii) vincristine, and (iii) 5-fluorouracil. All the 25 cases were thoroughly evaluated before and after treatment by clinical, electroencephalographic, angiographic and biochemical methods. A significant improvement was noted in 16 cases (64%). Of the improved group (16 cases), 11 received therapy by intra-arterial route, which clearly indicates that this may be the best route of administration of drugs in cases of recurrent and metastatic brain tumours. The survival period of improved cases with a better quality of life ranged from 3 months to 38 months, with a mean survival period of 10.7 months.

All the improved cases showed a significant increase of cerebrospinal fluid and serum uric acid levels and thus this may be considered as the best biochemical marker of tumour response to drugs.

* * *

Undernutrition may not affect drug metabolism

Does the nutritional status of a patient influence the magnitude and duration of drug effects and therapeutic response? If it does, then a serious review has to be made of the dosages prescribed for most of the drugs and pharmaceuticals, as the prescriptions are based mostly on pharmacokinetic studies and drug trials carried out on healthy, well-nourished volunteers of developed Western nations. This problem assumes special significance in relation to undernourished patients in most of the

developing countries. This is what prompted a CSIR postdoctoral fellow to study the role of nutrition, or undernutrition, in drug elimination. The study carried out, though on a limited scale, by Dr (Smt) Uma Kohli has shown no significant differences in the metabolism of the commonly used antipyretic and analgesic drug paracetamol (acetaminophen) in undernourished and normal subjects.

In a majority of subjects—normal as well as undernourished—the drug elimination followed a single-order kinetics. In a minority of cases—2 out of 12 normal and 3 out of 12 undernourished—there was observed a biphasic elimination of the drug. Undernutrition, however, did not have any effect on drug elimination in either category and in either phase. The study was carried out at Central Drug Research Institute, Lucknow, under the supervision of Dr S.K. Sharma of the Biochemistry Division.

Although the conclusion of the study sets at rest misgivings about the adverse effects of undernourishment in drug metabolism, there is need to extend it to other commonly used drugs and to a wider groups of volunteers. This is because the importance of defining drug dosages according to the nutritional status of individuals cannot be underestimated, especially in developing countries where the bulk of the population suffers from malnutrition. □

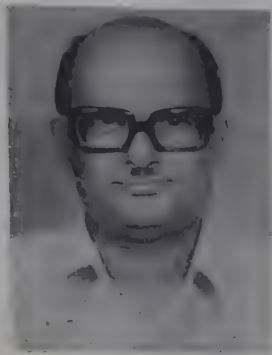
PERSONNEL NEWS

Shri B.K. Mazumdar honoured with director's salary grade

Shri B.K. Mazumdar, Scientist F, of Central Fuel Research Institute (CFRI), Dhanbad, has been honoured with the scale of pay equivalent to that of a director (24 July 1982).

Shri Mazumdar (born 1 Feb. 1925), after a brilliant academic career at Calcutta University, has been with CFRI since 1950. A specialist in coal science, Shri Mazumdar has propounded new concepts in the science of

coal and worked extensively on the systematics and constitution of coal, and novel methods of coal utilization.



Shri B.K. Mazumdar

His discoveries on the inter-relationships of coal properties and the new systematics of coal, correlation of intrinsic properties of coal and proximate analysis have led to a new grading system. His contribution to the assessment and elucidation of several structural parameters of coal, mostly by chemical methods, and the concept of depicting the structural genesis of coal from lignite to anthracite in terms of four models designed to portray the transition during geochemical evolution, is considered a breakthrough in coal science. His concepts have of late been corroborated by foreign scientists by way of physical methods and structural models.

Along with his colleagues he has patented a chemical process for coal demineralization for producing coals of low- and sub-low ash levels. He and his colleagues have also developed a coal-based multipurpose nitrogenous organic fertilizer. Tested at CFRI and elsewhere, the fertilizer has been found to be superior to the traditional fertilizers like urea and ammonium sulphate. The discovery of 'combination fertilizers' containing coal-acids and conventional N-fertilizers is found to augment the nitrogen utilization efficiency of the traditional fertilizers, as a result of which crop productivity can be enhanced by at least 30%.

His contributions to formed coke technology won him the National Metallurgists' Day Award for 1969. He

is the first recipient of the prestigious Senior Coal Scientist Award (1979). He has represented India in several international coal conferences, the latest of them being the 1982 Gordon Research Conference in USA wherein he expounded new concepts on system, structure and behaviour of coal.

He has to his credit about 70 research papers, 12 technical reports, and six patents. □

Appointments Promotions

Dr T.S. Ranganathan

Dr T.S. Ranganathan, Scientist E II, of Central Leather Research Institute (CLRI), Madras, has been appointed, on promotion, Scientist F (20 Aug. 1982).

Dr Ranganathan (born 1927) obtained B.Sc. degree in chemistry (1948)



and B.Sc. Tech. in leather technology (1950) from Madras University. With CLRI since June 1952, he obtained M.Sc. degree for his work on mechanism of chrome-vegetable-tannin combination tannages in 1956. Deputed to UK in 1956 under the Colombo Plan, he obtained his Ph.D. degree from University of Leeds for elucidating the mechanism of zirconium and zirconium combination tannages. At CLRI he has carried out extensive research on zirconium salts and their application to produce speciality leathers. Two processes, one for the manufacture of zirconium tanning salts and the other for the manufacture of chromium-zirconium combination tanned leather for making gloves for air force pilots, have been released to industry. He was a visiting scientist and an honorary

member of the staff of Proctor Department of Food and Leather Science at University of Leeds in 1968 under the CSIR-British Council Exchange Programme.

His current research interests relate to reducing pollution load in tanneries, developing newer tanning materials and finishing techniques, and upgrading low-grade leathers. He was awarded a cash prize by National Research Development Corporation of India for developing a novel technique of printing on leathers, called 'Novotone', in 1981.

* * *

Dr R. Selvarangan

Dr R. Selvarangan, Scientist E II, of Central Leather Research Institute (CLRI), Madras, has been promoted as Scientist F on *ad hoc* basis (27 Sep. 1982). He is at present head of the Tanning and Finishing Area and also in charge of CLRI's tannery.

Dr Selvarangan (born 5 July 1926) obtained bachelor's degree in chemistry



from St Joseph's College, Tiruchirapalli, in 1946, postgraduate degree in leather technology from A.C. College of Technology in 1948, and Ph.D. from University of Madras in 1960.

Following industrial experience with a private sector tannery, Dr Selvarangan has been with CLRI since its inception, and has headed various areas and disciplines. With more than 250 research papers and 13 patents, he has contributed substantially to the development of tanning industry.

Dr Selvarangan received advanced training in leather technology in USA in

1955-56. He has held several assignments—as a Colombo Plan leather expert in Sri Lanka (1960-61), FAO, leather expert in Sudan and Somalia (1966-71), and Managing Director, Rajasthan State Tanneries Ltd (1976-78). He undertook a study tour of European countries last year. His current interests are in developing newer tanning processes with pollution control and newer finishing techniques for upgrading low-quality leathers.

Dr A.P. Joshi

Dr A.P. Joshi, Scientist E, has been appointed on promotion Scientist F at CSIR Centre for Biochemicals, Delhi.

Dr Joshi (born 26 Oct. 1932) obtained Ph.D. degree in biochemistry from M.S.



University of Baroda and diploma in biochemical engineering from University College, London. Dr Joshi has been with this CSIR Unit since 1966 and since 1977 he has been Scientist in charge. In 1981 he was with the Biochemical Engineering Research Centre, IIT-Delhi, as Visiting Professor on deputation.

Prior to joining CSIR, Dr Joshi had worked at Koch Light Laboratories Ltd, Colnbrook, Bucks, where he established a full-fledged division for manufacturing biochemicals, first of its kind in UK, and headed it for five years (1961-66).

Dr Joshi's major research interests are immunology, waste utilization, and biomethanation of industrial effluents. He is a founder-member of Indian Society of Biotechnology. He is also secretary of the national organizing

committee for the Seventh International Biotechnology Symposium (1984). □

Transfers

Shri Fakhre Alam, Finance & Accounts Officer, Industrial Toxicology Research Centre, Lucknow, on transfer and promotion assumed charge as Senior Finance & Accounts Officer at National Chemical Laboratory, Pune (15 Sep. 1982).

Shri N.G. Parmar, Section Officer, on transfer from National Environmental Engineering Research Institute, Nagpur, joined NCL, Pune (22 Sep. 1982).

Shri N.C. Jain, on transfer and promotion from National Physical Laboratory, New Delhi, took over as Senior Finance & Accounts Officer, Publications and Information Directorate, New Delhi (2 Nov. 1982).

Retirements

Dr D.D. Nanavati, Scientist E1 of the Organic Chemistry Division of National Chemical Laboratory (NCL), Pune, retired on 31 August 1982. Winner of the Jaipuria Gold Medal for pioneering work on selective nickel catalyst for *anaspatis* production (1957). Dr Nanavati had joined NCL in 1954. In 1971-72 he was invited as a Visiting Scientist by the Technische Hogeschool, Twente, Enschede, The Netherlands. He has published 30 research papers.

Shri H.L. Khurana, Senior Finance & Accounts Officer, Publications & Information Directorate, New Delhi, retired on 31 October 1982. □

Honours & Awards

Dr C.R. Krishna Murti

Dr C.R. Krishna Murti, Director, Industrial Toxicology Research Centre, Lucknow, has been nominated chairman of the working group for coordinating eco-developmental research activities in Ganga basin. The terms of reference of the working group,

constituted by the Department of Environment, are: to identify priority projects and institutions/agencies, and individuals for undertaking these projects; to examine project proposals for financial support; to oversee the implementation of the projects and to suggest mid-term correction as and when needed; and to collate major findings/data to be made available through these projects and interactions with concerned development agencies.

Dr D. Chakravorty elected INSA fellow

Dr Dipankar Chakravorty of Central Glass & Ceramic Research Institute, Calcutta, has been elected a fellow of



Indian National Science Academy. This honour is in recognition of his original contributions in materials science. Among them are development of (i) electronically conducting glasses and glass-ceramics having a dispersion of metallic granules of several hundred angstroms diameter; (ii) some new amorphous oxide semiconductors containing variable valence ions like Sb^{5+}/Sb^{3+} and As^{5+}/As^{3+} ; and (iii) ceramic bushing for drawing continuous glass fibres for reinforcement.

For a brief profile of Dr Chakravorty's career and achievements, see *CN*, 32(1982), 135.

Dr R.A. Mashelkar

Dr R.A. Mashelkar of National Chemical Laboratory, Pune, has been honoured with membership on the editorial board of *Rheologica Acta*. □

Prime Minister stresses on CSIR-university links

The Prime Minister, and President of CSIR, Smt. Indira Gandhi, stressed the need for the Council of Scientific & Industrial Research and the university systems strengthening each other.

Presiding over a meeting of the CSIR Society on 4 November 1982 in New Delhi, she said: "We should not only think of what the universities can do for us, but also of what we can do for the universities for improving the quality of education. There is a close linkage between the development of the educational system and the capabilities in the R&D system." She was happy to note that there was already increasing cooperation between the two.

She also underlined the need for a constant review of the linkages between CSIR and industry, and for devising measures to help and encourage younger scientists in the pursuit and promotion of scientific research.

The CSIR President said she had high regard for the work of CSIR scientists and hoped that the organization would grow from strength to strength. At the same time, she referred to the need for greater utilization of the work done by CSIR, specially the technology generated by it.

Earlier, Prof. S. Nurul Hasan, Vice President of CSIR, said that special efforts were being made to undertake comprehensive research and development programmes, covering major sectors of the industry. CSIR was making special efforts to implement the commitments regarding science incorporated in the Sixth Plan, he added.

Dr G.S. Sidhu, Director General, CSIR, presented the annual report and

gave an account of the progress made during the last year. □

CECRI's Get-together with Batteries and Fuel Cells Industries

Primarily to identify R&D programmes of immediate interest to industries concerned with primary batteries, as also secondary batteries and fuel cells, Central Electrochemical Research Institute (CECRI), Karaikudi, organized two get-togethers of scientists engaged in the concerned areas of R&D with the industries' representatives. The meets were held at CECRI's Unit at CSIR Complex, Madras, on 3 and 4 November respectively.

Primary Batteries

The first get-together concerned itself with Leclanche-type dry cells and other primary batteries as power sources in 1980's and with R&D efforts needed in India on designing alternative materials and ensuring quality control.

In his inaugural address, Shri R.M. Nayyar, Vice President of the Battery Products Division of Union Carbide India Ltd, Calcutta, called upon the national laboratories to undertake R&D work with the right emphasis on both short-term business needs and long-term requirements. CECRI, he suggested, could develop methods for rapid evaluation of the suitability of indigenous manganese ores in Leclanche dry batteries. Another problem suggested by him was the study of cause-effect relationship with Leclanche-type dry batteries made with indigenous raw materials. Identifying a priority system and developing a complete technology encompassing

design, equipment, cost, productivity and economy was another suggestion put forth by the inaugural speaker.

Delivering the presidential address, Dr N.R. Mantena, General Manager (Technical) of Hindustan Machine Tools Ltd (HMT), Bangalore, stated that although HMT was manufacturing both mechanical and electronic watches, the latter had not become so popular for want of a suitable battery system with a long shelf-life. It was very essential that the life of the battery should be at least 5 years. Hence his suggestion that attention be paid to developing a dependable battery system with at least 5 years' life. He also mentioned that HMT was taking steps to put up a plant for the manufacture of silver oxide-zinc cells in collaboration with a Japanese firm at Gauhati. While at present silver oxide-zinc is serving its purpose in electronic watches, he felt that lithium batteries might be the future system required in such watches.

Dr K.S. Rajagopalan, CECRI's Director, who presented the state-of-the-art report on primary batteries, dealt with the development of different battery systems right from Leclanche dry cells, which were introduced in 1902. He referred to the battery systems of the future such as solid electrolyte batteries, metal-air batteries, and lithium batteries. He also presented the ongoing

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R&D work at CECRI on various battery systems. The porous carbon element developed by CECRI and licensed to a party in Madras, he said, was meeting the requirements of the Indian Railways.

In the first session, presided over by Prof. K.S.G. Doss, a former Director of CECRI, the institute's scientists presented their work in this field. Reported at this session were: (i) different types of water-activated magnesium batteries and silver oxide-zinc reserve batteries; Leclanche dry and wet cells, prepared with indigenous manganese ores and conforming to IS specifications; alkaline manganese dioxide wet cells; alkaline mercuric oxide cells; Weston cadmium standard cells; aluminium batteries; production of electrolytic manganese dioxide from chloride solutions by employing both graphite and titanium anodes; lithium-manganese dioxide cells; preparation of porous carbon electrodes used in air-depolarized cells; and solid electrolyte batteries.

In the concluding technical session, presided over by Dr Rajagopalan, a number of recommendations were made. These were (1) There should be more rapport between Defence R&D institutes working on primary batteries and CECRI; (2) Statistical significance and performance of battery types should be obtained by getting standard deviation; (3) The starting of a bulletin devoted to batteries by CECRI may be implemented early; (4) CECRI should develop rapid methods of evaluation of battery components like manganese dioxide; (5) Work on chemical manganese dioxide may be sponsored at CECRI by industry; (6) In taking up the work on newer battery systems, CECRI should keep in mind the cost factor; and (7) A meeting may be held between the manufacturers of dry cells in the organized sector and CECRI to identify areas of common interest.

Secondary Batteries and Fuel Cells

The second get-together, on secondary batteries and fuel cells, discussed

the present status of the technology, future trends, scope of R&D, and the specific needs of Indian battery manufacturers.

Inaugurating this meet, Shri J. Vedamuthu, Executive Director of Standard Batteries Ltd (Oldhams Division), Madras, referred to the growing importance of sealed lead-acid batteries based on recombination technology and maintenance-free batteries. Continuing, he said that the lead-acid battery industry today accounted for over 50% of the lead consumption per year and the lead-acid battery covered 90% of battery power systems available at present. Plastics in the grid were now a reality. The wide range of plastics had opened up great possibilities for manufacture of light and extra-strong containers, with huge savings of 20 to 30% in the weight of finished battery.

Presiding over the function, Dr D. Ajitha Sinha, Deputy Director General of Indian Standards Institution (Southern Region), Madras, gave an account of the involvement of CECRI in formulating standards for various batteries.

The CECRI Director presented a brief report on the state-of-the-art on the secondary batteries and fuel cell industry and gave an overall picture of the work done by CECRI in this field. He also made mention of some new systems such as nickel-zinc, nickel-iron, zinc-air, zinc-chlorine, and sodium-sulphur batteries. Fabrication of lead-acid battery of a high energy density of the order of 35 Wh/kg required for the operation of vehicles had been designed and fabricated by CECRI, he added.

In the first technical session, presided over by Shri P.K. Khuller, Additional Director of Research Designs and Standards Organisation, Lucknow, scientists from CECRI presented their R&D works in this field. These included: (i) fabrication of lead-acid batteries for low-temperature applications; high-energy density silver oxide-zinc rechargeable batteries for aircraft and

other defence applications; technology developed for the production of nickel-cadmium batteries, both vented and sealed type; low-temperature alkaline hydrogen-oxygen fuel cells; zinc-chlorine battery with a high theoretical energy density of the order of 460 Wh/kg; nickel-iron and nickel-zinc batteries with potentialities as power source for electric vehicles; sodium-sulphur battery employing beta-alumina as diaphragm; and rechargeable zinc-air secondary cells (total output of about 1500 Ah).

In the second technical session, presided over by Shri B.S. Kedare of Standard Batteries Ltd, Bombay, Dr Subba Rao of Vikram Sarabhai Space Centre, Trivandrum, presented the Indian Space Research Organisation's work on different types of secondary cells like nickel-cadmium, silver oxide-zinc, and lithium batteries, and fuel cells.

In the last session, presided over by the CECRI Director, the following recommendations were made: (1) A meeting may be arranged between the manufacturers of lead-acid batteries in the organized sector and CECRI to identify work of common interest in regard to (i) maintenance-free batteries, (ii) bipolar cells, and (iii) batteries for electric vehicles; (2) CECRI may take up immediately studies on (i) grid corrosion, (ii) dendritic growth of zinc in rechargeable battery types, (iii) separators, (iv) rate of charge of alkaline batteries, (v) utilization factor, and (vi) cause of shedding of active materials for positive plates; (3) CECRI and ISRO may have a dialogue on complementing each other's efforts in developing new battery systems; and (4) A meeting may be held between CECRI and other institutes developing and producing nickel-cadmium batteries to find out the scope of collaboration. □

Machine for boring and skirting

An indigenous machine for making bore holes and trenches has been designed and developed by Central Building

Research Institute (CBRI), Roorkee. This is essentially required for laying skirted granular pile and bored pile foundations in low bearing capacity and difficult soil conditions. The institute has also carried out successful operational trials with the machine.

The machine comprises a system of rotary auger, a boom to support the auger for working in vertical or any other inclined position, and a chassis which, in addition to providing base to the boom and auger system, carries a power winch assembly for raising and lowering the auger. The machine can be moved on four wheels.

The bore holes are made in the ground with the rotating auger. For making a trench, a number of bore holes are made side by side, and the soil portion left over between the two adjoining bore holes is punched down to provide a clean-sided slot or trench. The cut spoilage which falls into the bore holes already made is removed by an auger or tamped down there only. The

machine can drill holes and trenches of diameters or widths of 15-45 cm and depths of up to 5 m. Depending upon the configuration of the foundation footing, the trench may be circular, square, or rectangular. While boring in water-bearing soils and sandy soils, use of bentonite slurry is recommended for stabilizing the sides of the freshly made bore (or trench), so as to avoid the danger of the collapse of the bore (or trench) during and after its formation.

The trench made around the footing when filled with reinforced cement concrete provides a strong skirt for checking the lateral movement of the soil from below the foundation footing, thereby resulting in an increased load-carrying capacity of the foundation system.

Weighing about 800 kg, the machine is compact, and easy to operate and manufacture. It is powered by an electric motor of 3 hp and costs about Rs 20,000. It possesses great potential in the construction of skirted footing foundation, skirted granular pile foundation, as well as in bored pile foundations both vertical and batter type and both plain and under-reamed. □

NCL's tissue culture expertise sought by industry

At National Chemical Laboratory (NCL), Pune, a scheme for multiplying hybrid Napier grass by tissue culture technique has been sponsored by National Organic Chemical Industries Ltd (NOCIL), Bombay. A protein-rich fodder for cattle, hybrid Napier grass which when grown through a new technique known as nutrient film technique (NFT) can yield up to 300 tonnes of grass per acre as against a normal yield of 80-100 tonnes per acre. Under its massive programme to benefit the rural poor, NOCIL proposes to supply the hybrid grass plants together with NFT installations to various villages. □

Solanum khasianum as a source of solasodine

The berries of *Solanum khasianum* contain a glycoalkaloid which can be converted into a steroid hormone, solasodine, the starting raw material for oral contraceptives. Hence the optimum conditions for commercial cultivation of *S. khasianum* and for increasing the yield as well as quality of berries have been investigated by Shri J.N. Hazarika of the Division of Medicinal & Economic Plants of Regional Research Laboratory (RRL), Jorhat.

To increase the berry yield, various agronomical practices were studied. Experiments were done to increase the berry yield and solasodine content by application of different hormones such as gibberellic acid or by treating the seeds with mutagenic chemicals or by irradiation.

Mature yellow berries contained more solasodine than green, young berries or over-ripe ones. The berry yield and solasodine content of individual plants varied and no correlation could be found out. Solasodine contents varied with the place of collection. Yield of berries was found to be the highest when the pH of the soil was 6.5-7.0, and maximum yield of solasodine was obtained when the pH was 5.5 and 6.5. A spacing of 90 × 90 cm in plants was found to be optimum. The optimum dose of N,P,K under field conditions was found to be N₈₀P₄₀K₄₀ kg/ha. The plant suffered from a wilt disease caused by *Fusarium oxysporium*.

Among the eight fungicides tried, Benlate was found to be most effective when sprayed @ 0.3% solution before flowering.

A high-yielding, improved strain of *S. khasianum*, designated as JRL-30, was isolated. This strain could produce on an average 6.14 tonnes of berries per hectare, its solasodine content being 3.28% (dry weight basis). During the process of selection of a high-yielding strain, 14 thornless plants were found. Of these, a comparatively high-yielding



CBRI-developed machine for boring and skirting. Weighs about 800 kg, is compact and easy to operate. Costs about Rs 20,000

strain was selected, which gave on an average about 11.64 tonnes of berries per hectare and about 48 kg solasodine per hectare.

The results of irradiation of *S. khasianum* seeds with γ -rays (Co-80 source) of 10, 20 and 30 kr showed that the middle dosage was most suitable from the point of view of yield.

Shri Hazarika was awarded Ph.D. degree by the Assam Agricultural University, Jorhat, for his thesis based on the studies. His guide was Dr S.K. Addy, Professor, and Head of the AAU's Department of Agri-Botany and Plant Pathology. □

Decapod larvae of Indian Ocean

The zooplankton—the food of the fish—are composed of many groups of organisms. One of the major groups is decapod to which belong the prawns, shrimps, crabs, and the like. The study of these groups and larvae would not only provide information about their fisheries but also indicate the fish food potential. This prompted Shri V.T. Paulinose of the Cochin regional centre of National Institute of Oceanography (NIO), Dona Paula, Goa, to study samples from the Indian Ocean for identification, occurrence, distribution, abundance, systematics and developmental stages of decapod larvae, particularly of the family Penaeidae and subfamilies Penaeinae and Sicyoninae. Hitherto these were not described and hence added to the advancement of knowledge of penaeid larvae from the Indian Ocean, which in turn will throw light on the potentials of commercially important prawns like *Penaeus*, *Metapenaeus* and *Parapenaeopsis*, besides other species which form the diet of fishes. From the study of over 350 specimens, 21 species belonging to 11 genera were identified. A key for identifying the larvae and post-larvae of the penaeid prawns of the Indian Ocean has been prepared by the researcher.

For his thesis based on the studies, Shri Paulinose was awarded Ph.D. by

Kerala University. The work was done under the guidance of Dr S.Z. Qasim (formerly NIO's Director and now Secretary, Department of Ocean Development, New Delhi). □

Liquid crystalline compounds for use in gas chromatography

The separation and identification of close boiling positional isomers of disubstituted benzene and naphthalene is very difficult through gas chromatography with conventional columns. Shri K.P. Naikwadi of the Organic Synthesis Division of National Chemical Laboratory, Pune, has synthesized liquid crystalline compounds, which when employed as stationary phases could bring about complete separation of α -naphthylamine from β -naphthylamine, and α -naphthol from β -naphthol. Retention behaviour and relative retentions for positional isomers of disubstituted benzene were studied in solid state as well as in nematic state of the liquid crystalline compounds. Some compounds showed separation of positional isomers on solid state. Complete separation of xylene isomers and methylanisole isomers could be achieved on solid state of certain liquid crystalline compounds.

These compounds were also used for identifying Friedel-Crafts reaction products by gas chromatography.

On alkylation of benzene and toluene with organic esters as alkylating agents in the presence of $AlCl_3$, only *m*-dialkylbenzene was obtained, whereas usually a mixture of dialkylbenzene isomers is obtained.

2-Methyl-4'-substituted 4-(4'-*n*-alkoxybenzoyloxy)azobenzenes, the liquid crystalline compounds, were prepared through condensation in pyridine of 4-(4'-substituted phenylazo)-*m*-cresol (I) with *p*-alkoxybenzoyl chloride (II). *p*-Substituted aniline after diazotization was coupled with *m*-cresol to obtain compound I, *p*-substituents being methyl, ethyl, *n*-butyl, and methoxy. *p*-Alkoxybenzoic acid, prepared from *p*-hydroxybenzoic acid with

alkyl bromide in the presence of KOH, on reaction with thionyl chloride, gave compound II.

Shri Naikwadi was awarded Ph.D. degree by Shivaji University, Kolhapur, for his thesis based on the studies. He worked under the supervision of Dr B.B. Ghatge of NCL. □

Studies on cellulases and hemicellulases

A mutant of *Sclerotium rolfsii* which has 2 to 2.5 times greater filter-paper-degrading activity in submerged cultures than that of the parent CPC₁₄₂ strain has been isolated by Shri M.V. Deshpande of the Biochemistry Division of National Chemical Laboratory (NCL), Pune. The mutant (UV-8) also produces larger amounts of β -glucosidase and xylanase than the parent strain, which itself is a high cellulase- β -glucosidase-xylanase producer. The optimization of cellulase, β -glucosidase and xylanase by UV-8 *S. rolfsii* was studied in shake flasks. The best yields obtained (IU.ml⁻¹) were: filter paper activity, 1.8-2.2; carboxymethylcellulase, 170-190; β -glucosidase, 18-23; and xylanase, 170-200.

The culture filtrate from the mutant yielded a high degree of saccharification of cellulosic materials, comparable with those of the highly improved strains of *Trichoderma reesei*. The presence of high amounts of xylanase in culture filtrates was found beneficial in saccharification of lignocellulosics. With the UV-8 culture filtrate and at 15% substrate level, solutions containing 10.8-11.2% and 8.5-9.5% reducing sugars were obtained in 24-28 hr from alkali-treated (AT) rice straw and AT-bagasse, respectively. The main sugar in the hydrolysate from cellulose (Avicel) was glucose (85-90%) with a little (1%) cellobiose.

The feasibility of coupling enzymatic saccharification with yeast fermentation was investigated. The amounts of ethanol produced in the coupled system in 96 hr were 3.5% (w/v) and 3.2% (w/v) from AT-rice straw and AT-bagasse

respectively with an initial lignocellulosic material concentration of 15%. The yield of conversion of glucose in enzymatically hydrolyzed AT-rice straw and AT-bagasse to ethanol varied between 85 and 90% of the theoretical yield.

Xylanase from the UV-8 culture filtrate was also purified and characterized. The purified, homogeneous enzyme was found to be composed of one polypeptide chain. The molecular activity V_{\max}/E was $2.29 \times 10^5/\text{min.}$, only one active site being assumed. Viscometric and other studies revealed the non-arabinose-liberating endomethanase mechanism of the purified xylanase, which produced mainly xylose from xylans.

Shri Deshpande, who worked under the guidance of Dr J.C. Sadana, was awarded Ph.D. degree by Poona University for his thesis based on the studies. □

Stabilizing MnO and FeO for use in ferrites

Certain transition-metal oxides in their lowest oxidation states are oxygen-sensitive and, therefore, unstable in air. MnO and FeO fall into this category; FeO disproportionates into Fe_3O_4 and Fe, even in vacuum. Shri C.E. Deshpande of the Physical Chemistry Division of National Chemical Laboratory (NCL), Pune, has made attempts to stabilize these oxides with a view to using them in ferrites. MnO could be stabilized in the form of solid solution with insignificant amounts of ZnO. ZnO dissolved in MnO, forming ideal solutions, up to a limit of 10 mol % of ZnO, with a linear decrease in the cubic lattice parameter of MnO, the colour changing progressively from olive-green to orange-red. FeO could be stabilized by relatively small amounts of Fe^{3+} , as $\text{Fe}_{(1-x)}\text{O}$ ($x < 0.1$). While FeO and MnO were unstable independently, they formed solid solutions with each other, covering the whole range from 100% MnO to 100% Fe.

Stabilized MnO finds application in the synthesis of manganous zinc ferrous ferrites (also called high-permeability ferrites or professional soft ferrites) used extensively in low-loss, high-frequency transformer cores. Stabilized FeO can be employed in the synthesis of ferrous zinc ferrites, which in spite of their high saturation magnetization have not been explored commercially because of the difficulty in synthesizing them. Very efficient and convenient methods of sintering these ferrites in static controlled atmospheres, in place of the 'flowing' ones used earlier, were worked out.

Shri Deshpande was awarded Ph.D. degree by University of Poona for his thesis based on the studies, carried out under the guidance of Dr M.N.S. Murthy of the laboratory. □

PROGRESS REPORTS

NBRI-Lucknow Annual Report: 1981

Twenty-five research projects, 22 of them of applied and three of fundamental nature, were investigated by National Botanical Research Institute (NBRI), Lucknow, during 1981, according to its annual report for that year just published by the laboratory. Besides, ten projects were pursued either through sponsorship or as collaborative/coordinated research programmes.

To the germplasm bank maintained by the laboratory were added 55 new taxa. The conservation work was greatly aided by the tissue culture technique, which involved raising of root cultures of several herbaceous and woody plants for long-term storage without their undergoing genetic changes and/or loss of regenerative potential.

The protein contents and amino-acid composition of seed meals of 21 species, belonging to 7 genera of Leguminosae, were analyzed. Seed meals of *Acacia coriacea* and *Sesbania bispinosa* were found to contain exceptionally high concentrations of methionine (10.2%) and lysine (14.0%) respectively. The oil from the winged bean (*Psophocarpus*

tetragonolobus) seed was found to be comparable to any edible oil and had a half-life of about 1½ years and did not suffer deterioration in quality.

The botanical identity of 15 Unani and Ayurvedic drugs was standardized, and standards for 9 Unani compound formulations were laid down. A central herb garden was established at NBRI's Banthra Research Station under a scheme sponsored by Central Council for Research in Unani Medicine.

Following successful cultivation of *Kallstroemia pubescens*, a new source of diosgenin, both at Lucknow and at Calcutta, commercial cultivation of the crop was taken up in the country. A package of cultural practices was also worked out.

In ornamental horticulture, five totally new foliage amaranths for pot culture developed earlier were released to nursery trade. Four of them are diploid and one is a tetraploid. This laboratory's researches over the last 10 years on evolving chrysanthemum cultivars have led to varieties at least one of which blooms each month; as a result, it is possible to have chrysanthemum blooms round the year. A highly aesthetic form of miniculture, named 'Arrangement Culture', was perfected; it consists of growing, in vases and bowls, dwarf mini-chrysanthemums in such a fashion that the whole composition when in bloom looks like an artistic arrangement.

Four gamma-ray-induced mutants, two each of chrysanthemum and rose, were isolated and multiplied. Tests on their performance were under way. Two bougainvillea cultivars, Chitra (a hybrid seedling) and Surekha (a bud-sport) as also a climbing mutant of a miniature rose, were isolated.

An important project in the area of miscellaneous economic plants is the survey and cultivation of protein-rich algae, whose objective is also the utilization of solar energy. In this, a complete package of biotechnology of *Spirula* cultivation in sewage was developed and tests were under way in a

60-kl, indigenously developed high-rate oxidation pond system. The average production was 6.5 g/m² per day of dry *Spirulina*, with 55% crude protein of an excellent amino-acid profile. Multi-localational trials have shown that dry *Spirulina* is totally free of pathogenic bacteria and amoeba. Trials were also under way on using the dry *Spirulina* biomass as a high-protein, high-carotene additive in chicken feed and on the use of the effluent resulting from the harvesting of the alga as fish culture. The water reclaimed from fish culture could be used for irrigation. Another project of importance in the area of miscellaneous economic plants concerns jojoba (*Simmondsia chinensis*), an important source of liquid wax, which in turn is a good substitute for sperm whale oil. Mass multiplication of the plant was achieved through grafting and tissue culture.

A project whose spinoffs are of substantial utility to small farmers is the one relating to modernization of *pan* (betel vine) cultivation. NBRI's record of work includes improvement of cultivation practices, organization of nurseries on scientific lines, supply of disease-free propagating material to cultivators, evolving fertilizer schedules, and developing disease-control measures. In progress were experiments to prolong the storage life of the harvested leaves. The institute had stocked 86 cultivars, the largest collection of germplasm in the country.

From an ethnobotanical survey of 35 tribal villages in Mirzapur district (Uttar Pradesh) some 250 plant species and plant products used by tribals were collected and identified. Importance attaches to this project as the new knowledge could be used to improve the economy of the tribals by setting up plant-based cottage-scale industries.

A project aimed at the utilization of solar energy to meet fuel needs was started with the setting up of a Biomass Research and Training Centre at (NBRI's) Banthra Research Station under the sponsorship of the

Department of Science and Technology. The centre's principal objective is to generate technology for producing plant biomass for fireweed, alcohol, and hydrocarbons. Three varieties of sugar-beet, viz. Polyrave N, AJ-I and Trirave, with high sugar contents were evaluated for conversion of their sugars into alcohol by using PAC and *Saccharomyces cerevisiae* yeasts. The last two varieties were found to be best suited for being processed into alcohol, but from the point of view of biomass production and sugar content the first was most suitable.

In collaboration with the state government's Social Forestry Department, a statistically designed experiment was laid out to raise 12 *usar* (saline)-tolerant firewood species with a view to understanding the productivity of firewood in a short-rotation, high-density planting system. Research on petrocrops was under way in collaboration with Indian Institute of Petroleum, Dehra Dun. Six promising laticiferous species, of the initially selected 377 species, were being evaluated. In some cases, hydrocarbons yield was as high as 10% (dry weight basis).

The laboratory worked out agro-technology for a high-yielding strain of German chamomile (*Matricaria chamomilla*). The technology was evaluated with successful results, under a project sponsored by a German firm, in field trials on *usar* soils.

The laboratory started issuing a new quarterly titled *Applied Botany Abstracts* in place of its earlier monthly 'Current Literature in Plant Sciences'. Eighty-four research papers were published in journals and 45 presented at conferences.

* * *

NCL Annual Report: 1980-81

Sixty-one R&D projects spread over 16 areas, and seven projects of basic and exploratory nature, were investigated during 1980-81 by National Chemical

Laboratory (NCL), Pune, according to its annual report for the period published recently. Most of the projects were interdisciplinary in nature and were aimed at developing novel and innovative chemical technologies.

Development of catalysts for chemical processes is one of the important projects in which the laboratory is collaborating with a number of industries. A new zeolite catalyst for selective isomerization of xylenes developed in collaboration with Associated Cement Co. Ltd, Bombay, has been found satisfactory in pilot-plant studies. Another such catalyst, also developed in association with this firm, is used in alkylation of benzene to ethylbenzene, which is subsequently converted to the important industrial monomer styrene.

In drugs and drug intermediates, an important piece of work was the total synthesis of vitamin B₆, which is economically viable also; the process was being optimized for commercialization. All the intermediates for the synthesis, except 2-butene-1,4-diol, are indigenously available; this intermediate is likely to be produced by Hindustan Organic Chemicals Ltd in the near future.

The cytotoxic drug vinblastine was isolated, as sulphate, from the leaves of *Catharanthus roseus* (*Lochnera rosea*, *Vinca rosea*). The process has been optimized on 40 kg per batch scale with yields of about 1 g of vinblastine sulphate from 6-8 kg of leaves. Vials of vinblastine sulphate B.P. prepared and tested by Hindustan Antibiotics Ltd, Pimpri, with the NCL product met all specifications. Another important project in drug synthesis in which a measure of success was achieved is a novel method for the synthesis of the key intermediate for the anti-tumour drug 4-demethoxydaunomycin starting from 2-methylhydroquinone.

In materials science, emphasis was laid on materials for solar energy utilization. A solar selective molybdenum black film with a high solar

absorptance coupled with a low emittance in the thermal infrared region was prepared through an electrolytic technique. This made it easier to prepare surfaces for large-area solar collectors. A two-rod quartz bell-jar reactor for depositing hyperpure silicon on thin silicon rods was designed and fabricated. In continuation of this work, a larger stainless steel reactor in which deposition can be carried out on six thin rods simultaneously was designed and fabricated.

Methods were developed for clonal multiplication of pomegranate and cardamom, and for isolating virus-free banana plants by shoot tip culture. Fifth-generation trials carried out on wheat plants raised initially by tissue culture showed a gradual stability in the yield and grain quality in this generation. Plants raised from 20-year-old eucalyptus trees showed early flowering after two years. Work on multiplication of teak by tissue culture was continued; 200 teak plants were supplied to the Forest Development Corporation of Maharashtra, the sponsor, for field trials.

A significant piece of work in polymer science and engineering was the development of a process on laboratory scale for polyphenylene sulphide, a new engineering plastic with remarkable mechanical, thermal and chemical properties. Polymeric membranes for desalination were under development. Modified cellulose acetate polymers, prepared by NCL and tested at Central Salt & Marine Chemicals Research Institute, were found promising.

The laboratory assisted Bharat Pulverising Mills Ltd, Bombay, in commissioning a plant for the manufacture of endosulfan on a scale of 400 tonnes per annum. Endosulfan is a widely used broad-spectrum pesticide for which NCL developed technology. A semi-commercial plant for the manufacture of methylchlorosilanes, also based on NCL technology, was commissioned by Hico Products Ltd. At the request of National Research

Development Corporation of India, a 10 kg per batch pilot plant for production of terpineol from turpentine oil was designed and commissioned in collaboration with MERADO, Pune, and eventually transferred to Burma's Central Research Organisation in pursuance of the Indian Technical and Economic Cooperation Programme.

Processes for the herbicide Dalapon, the veterinary drug quinapyramine sulphate/chloride, and silver paste for mica capacitor electrodes were released for commercial utilization.

Basic researches were pursued by the laboratory in solid state chemistry, synthetic pyrethroids, pest control agents and other bioactive principles from renewable sources, coordination chemistry, molecular biology, catalysis, and polymer science.

During the year, 61 processes developed by NCL were in production with a turnover worth about Rs 300 million. As many as 134 research papers were published, and 13 patents were filed in India. □

CONFERENCE BRIEFS

International Conference on Urban Transport in Developing Countries

Prof. C.G. Swaminathan, Director, Central Road Research Institute, New Delhi, participated in the International Conference on Urban Transport in the Developing Countries held in Caracas, Venezuela, 18-20 October 1982. It was organized jointly by the Venezuelan, French and Italian transport ministries. Prof. Swaminathan, who was invited by the Institute of Transport of France, presented two papers, one on traffic safety and the other on strategic transport planning. Prof. Swaminathan's report:

The conference proceedings took place under eight technical groups, which addressed themselves to: strategic planning; management of public transport; materials and infrastructures used for public transport; economics and

regulations; traffic management; socio-political aspects; relationship between formal and informal sectors; and energy and urban transport.

In the concluding session, the CRRD Director emphasized the need for a closer collaboration amongst the developing countries themselves, inasmuch as the problems of transport are peculiar to the cities of the developing countries, and inasmuch as these are not always faced in the developed world. □

PERSONNEL NEWS

Appointments/Promotions

Dr D. Sen

Dr D. Sen, Scientist EII, of National Physical Laboratory (NPL), New Delhi, has been appointed, on promotion, Scientist F (11 Aug. 1982).



Dr Sen (born 27 March 1923) obtained M.Sc. degree in physics from Delhi University in 1944. After working for a few years in a CSIR-financed research scheme, he went to UK and obtained Ph.D. degree in physics in 1952 from London University.

Joining Central Fuel Research Institute, Dhanbad, in 1952, Dr Sen moved over to NPL in 1953. Since then he has been working here on optical and laser metrology and on gas laser development. His main contributions are in the fields of optical and holographic interferometry for high-precision measurements. He has published about 60 research and review papers. His current research interests include laser frequency stabilization and the use of stabilized lasers for length and angle measurements. Dr Sen has been

president of Optical Society of India for the last three years.

Dr P.C. Mehendru

Dr P.C. Mehendru, Scientist EII, of National Physical Laboratory (NPL), New Delhi, has been appointed, on promotion, Scientist F (24 Sep. 1982).



A B.Sc. (Hons) and an M.Sc. (Hons) in physics, Dr Mehendru obtained his Ph.D. from Delhi University for his work on luminescence as related to colour centres in alkali halides. He has been with NPL since 1949.

A pioneer worker in electrophotography, Dr Mehendru has contributed substantially to the development of photocopiers indigenously and has created an awareness of this field in the country. He has to his credit a number of innovatory awards from National Research Development Corporation of India and NPL's first Merit Awards, besides 16 patents. He has published more than 130 research papers in the fields of microwave dielectrics, colour centres, electrophotography and electrical properties of polymers, etc., and guided several Ph.D. scholars. His work has found wide applications, as for example in dosimetry, electrophotography, electrostatic separators, electrostatic dust filters, and xero-radiography.

Dr Mehendru has travelled widely to various countries, including England, France, Czechoslovakia, Switzerland, USA, Canada, and Japan and visited a large number of research laboratories engaged in the field of his interest. He is a member of Indian Physics

Association, of Association of Magnetic Spectroscopy, and a fellow of Society for the Advancement of Electrochemical Science and Technology.

Shri T.S. Krishnan and Dr S.M. Bose of Central Leather Research Institute, Madras, have been appointed, on promotion, Scientists F effective 2 and 19 August 1982 respectively.

Honours & Awards

A. Krishnamurthi Award
for Dr Vidya Gupta

Dr (Smt) Vidya Gupta of the Biochemistry Division of National Chemical Laboratory (NCL), Pune, has received A. Krishnamurthi Award from the Society of Biological Chemists (India) for the year 1981-82—an award given to be best full-length biochemical paper published in an Indian journal during a year. Dr Gupta's paper (co-author: P.K. Ranjekar of NCL) selected for the award is titled 'DNA sequence organization in finger millet (*Eleusine coracana*)' published in *Journal of Bioscience*, 3 (1981), 417.

In their award-winning paper the scientists report interesting results on the arrangement of different types of DNA sequences in two millet species and in rice—results which provide a strong basis for proposing new mechanisms to explain the gene regulation processes in plants. Control of gene regulation being a key problem in plant molecular biology, the citation says that Dr Vidya Gupta's work has made a definite contribution to the understanding of this problem. Dr Gupta, who joined NCL in 1978 as a CSIR research fellow, obtained her Ph.D. degree under Dr Ranjekar's guidance.

The award is instituted by Shri A. Krishnamurthi, a member of the Society of Biological Chemists (India) and a former Chief Editor of Publications & Information Directorate (CSIR).

Dr. L.K. Doraiswamy

Dr L.K. Doraiswamy, Director, National Chemical Laboratory, Pune, has been awarded S.H. Zaheer Medal for 1983 of Indian National Science Academy (INSA). He has also been elected INSA's council member for 1983-85.

PATENTS FILED

377/Del/82: A process for chemical phosphating of ferrous substrates, K.S. Rajagopalan, R. Srinivasan, N. Krithivasan, C. Rajagopal, M. Sethukumari & M.E.K. Janaki—Central Electrochemical Research Institute, Karaikudi.

389/Del/82: Process for the synthesis of activated enamines of 8-(4-amino-1-methylbutylamine)-6-methoxyquinolines, B. Bhat, Manju Seth, A.P. Bhaduri, N. Pal, S. Chandra & A.B. Sen—Central Drug Research Institute, Lucknow.

417/Del/82: Improved process for the production of electrolytic chromium powder, S.C. Das, T. Subbaiah, & R.P. Das—Regional Research Laboratory, Bhubaneswar.

418/Del/82: An improved process for the synthesis of tris-(1-azeridenyl)-phosphine oxide, D. Sengupta—Central Drug Research Institute, Lucknow.

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Advertisement No. 49 82

The Council proposes to appoint a Scientist F (scale of pay: either Rs 2000-125/2-2500 or Rs 2250-125/2-2500-EB-125/2-2750) at National Institute of Oceanography, Dona Paula, Goa, for identifying, planning, organizing and coordinating oceanographic research programmes comprising coastal, near-shore and offshore studies, including satellite oceanography and numerical modelling.

Further details about the post as well as the prescribed forms for sending curriculum vitae are obtainable for Joint Secretary (Administration), CSIR, Rafi Marg, New Delhi 110001. Deadline for receipt of applications at the above address is 27 January 1983.



CSIR NEWS

A SEMI-MONTHLY HOUSE BULLETIN OF CSIR

Coffee and tea whiteners

Casein and groundnut protein-based whiteners for use in tea and coffee as substitutes for milk have been developed by Central Food Technological Research Institute (CFTRI), Mysore. Being convenience products, these are free-flowing with instant dispersibility in a hot brew. One kilogram of the whitener is sufficient to make about 200 cups of coffee or tea, and the beverage has no off-flavour or greasy after-taste. The whiteners have good shelf-life and could be of much use in catering establishments and households.

In the CFTRI process, vegetable fat, protein (casein or groundnut protein) and buffer salts are blended and homogenized. Sugar and other ingredients are then added and the resulting product is converted into a concentrated emulsion. This is subjected to vacuum-shelf drying and packed in bottles. Its composition is: fat, 42-45%; sugar-40-45%; and protein, 10-12%.

The process of preparing whiteners from casein is being released through National Research Development Corporation of India for commercial utilization. □

CFTRI-based energy food plant commissioned

With the technical consultancy provided by Central Food Technological Research Institute (CFTRI), Mysore, Karnataka State Agro Corn Products Ltd have commissioned an energy food plant, their

fourth, at Raichur. The other three plants located, one each at Mysore, Belgaum and Chitradurga, have been producing the nutritious food supplement formulated by CFTRI for quite some time. Each of the manufacturing units has a capacity to produce 12 tonnes of the energy food per day (two shifts).

The energy food, formulated primarily for the mid-day meal programme of the state government for school-going children, is a blend of pre-cleaned, toasted and powdered cereal, pulse and oilseed flour. The cereal may be either wheat or a mixture of wheat and maize, the pulse may be green gram, Bengal gram or horse gram *dal*, and the flour, of groundnut, sesame or soybean. The blend is mixed with jaggery and fortified with A and B group vitamins and minerals such as calcium and iron. Each 100 g of the food provides about 14 g of protein and 360 cal. of energy. Older children and adults can consume it as such in powder form or after mixing with a little water or milk. For children between 6 months and 2 years, it is desirable to mix it with water or milk, cook for 1-2 min. and to give as porridge.

Andhra Pradesh and Tamil Nadu have shown interest in introducing the food in their nutrition programmes. Recently, 600 tonnes of the energy food were supplied from Mysore and Chitradurga units to a cooperative store at Madurai for the integrated child development programme in Tamil Nadu. □

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* *CSIR News* *
* *wishes its readers* *
* *A Happy New Year* *

CSIO develops analog seismograph

For the first time in the country, Central Scientific Instruments Organisation (CSIO), Chandigarh, has designed, developed and fabricated a fully engineered model of an analog seismograph based entirely on indigenous components and technology. The instrument finds extensive application in the study of geokinematics of a region by monitoring and recording micro-earthquakes, in detection and location of atomic explosions, in oil exploration, in investigations of earth structure for heavy building construction, and in other such fields.

The instrument is capable of processing low-frequency, low-amplitude noise-corrupted signal from a seismic sensor and of recording the information on a smoked paper for a maximum period of 115 hr. The unit is sufficiently rugged for unattended field operation. It is

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powered by rechargeable batteries of nominal voltage, which are capable of keeping the system alive sufficiently long. The complete seismic data recording can be synchronized either with the internally generated time clock or with the standard time ticks (ATA) available through radio transmission. The time mark with different widths appear on one side of the trace. The position of the various selectable parameter switches, at any time, provides the auxiliary information on gain, drum rotation rate, pen sensitivity, etc., which is recorded manually.

The instrument consists of (i) a signal-conditioning unit, (ii) a seismic timing unit, and (iii) a record-

ing unit. It operates on chargeable car batteries while in field and on internally provided dry batteries while in transportation. During transportation only the seismic timing system is kept 'on', while the drum rotation and translatory movement of galvano are kept 'off'. Power consumption by the two stepper motors is reduced to the best possible extent so as to increase the recording duration. The electronic circuitry for internal clock correction after a stipulated period eliminates the need for the highly accurate and temperature-controlled crystal. The clock may be synchronized within ± 10 ms accuracy. A better accuracy can also be provided but it is of no avail because of recording constraints. The instrument is relatively inexpensive, easier to operate and meets most of the requirements of seismic data recording.

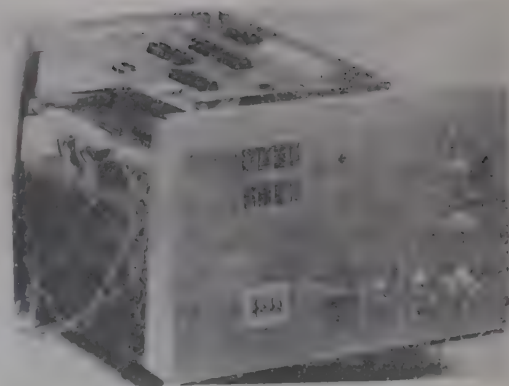
The country's demand pattern on the basis of users' requirement is of a very high order. The development of this instrument, has contributed towards the saving of a huge investment in foreign exchange and also reduced the users' dependence on foreign manufacturers for spare parts.

Efforts are under way to develop a microprocessor-based digital cassette seismograph which will further enhance the performance and analytical powers of the seismograph. □

Microprocessor-based

furnace-temperature controller

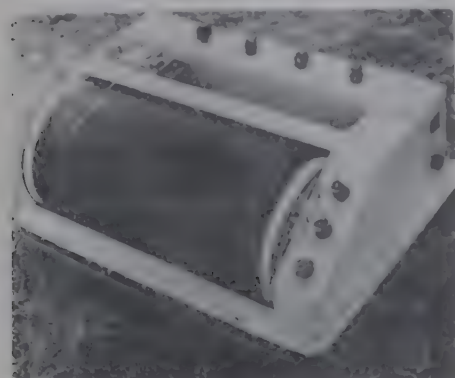
A complete laboratory model of a microprocessor-based furnace temperature controller has been designed and developed by Central Scientific Instruments Organisation (CSIO), Chandigarh. Experiments conducted on a 10-kVA furnace have shown that the temperature can be controlled with an accuracy of $\pm 1^\circ\text{C}$. This unit has been



Microprocessor-based furnace temperature controller (laboratory type) designed and fabricated by CSIO. Temperatures can be controlled with an accuracy of $\pm 1^\circ\text{C}$. The furnace can be modified for use in any process situation where electrical power is to be controlled as in water-baths, oil-baths, and refinery pipelines.

developed as one of the simulation models of the process control equipment. It consists essentially of four sub-units: (i) microprocessor circuitry, memory, buffers and address, data and control buses and input/output ports; (ii) signal-conditioning circuitry for chromel-alumel thermocouple and a 12-bit A/D converter with buffer; (iii) power control circuitry consisting of binary rate multipliers, optoisolators, zero-crossing detectors, triac and an isolated power supply for triac firing circuitry; and (iv) an operator console. The last one consists of (i) displays for set point, measured value, process constants, etc.; (ii) thumb-wheel switches along with band-switch for entering different parameter values, and (iii) switches to change the mode of functioning—either for monitoring only or for monitoring and controlling as well.

To operate the equipment it is necessary initially to enter the set temperature value and proportionality constant. The equipment can then be set for control purposes. The stored programs in EPROM will monitor the temperature. If it is less than the set point, it will



Analog seismograph (top – front view: bottom – rear view showing controllable digital clock) designed and developed by CSIO. Designed for the first time in the country, the seismograph is based entirely on indigenous components. Consists principally of (i) a signal-conditioning unit, (ii) a seismic timing unit, and (iii) a recording unit. Finds extensive use in studying geokinematics, detection and location of atomic explosions, oil exploration, massive civil engineering constructions, and other applications.

calculate the error as well as the corrective factor. The corrective factor will be applied to BRMs of the power control circuitry, which in turn controls the electrical power to be delivered to the furnace in a proportional manner.

Latest devices such as 8085, 8755, 8255, 7109, 8212, SP 5218, CA 3059, and MCA 255 have been used for reliability and programmability.

With a little modification, this equipment can be utilized in any process situation where electrical power is to be controlled, such as water-baths, oil-baths, and refinery pilot-plant pipelines. □

NAL's consultancy to VSSC on heat transfer facility

The National Aeronautical Laboratory (NAL), Bangalore, has rendered consultancy service to Vikram Sarabhai Space Centre (VSSC), Trivandrum, on the design, installation and qualification of air heaters for their heat transfer facility. The air heaters are required to heat the high pressure air to temperatures of up to 2000 K after which the air will expand through a nozzle to simulate the heat flux encountered in atmospheric flight of launch vehicles.

The air heaters consist of two combustors in series. The first combustor, which will raise the temperature of the air from 300 K up to 1000 K, is based on the principle of gas turbine main combustion chamber. The second combustor, which is based on the principle of jet engine reheat system, will be operated in series when air is to be heated in the temperature range 1000-2000 K.

The facility has already been used extensively for the qualification of thermal paint which replaces the cork thermal protection system in future satellite launch vehicle (SLV) flights. This

facility is also expected to give very valuable information related to thermal protection systems of future launch vehicles like augmented SLV and polar SLV.

The successful completion of this service is the result of the experience NAL has gained during the development of fuel atomizers and catalytic ignition system. □

NAL's technical advice to Raman Research Institute on plating of microwave components

The National Aeronautical Laboratory (NAL), Bangalore, has rendered consultancy to Raman Research Institute, Bangalore, on gold and copper plating of microwave components needed for their millimetre wave radio-telescope. Using this consultancy, RRI has made various components for actual use in the telescope. These components were tested by RRI and were found to satisfy their specifications.

The consultancy rendered included: (i) advice on the evolution of procedure for the preparation of high-purity gold plating solution for plating microwave components; and (ii) advice on making expendable mandrel and also the method for electroforming of horn out of copper using the mandrel. □

Chromatographic technique in pesticide studies

Methods to monitor pollution hazards of pesticides and to detoxicate them have been evaluated by Shri A.N.Kadam of the Organic Synthesis Division of National Chemical Laboratory (NCL), Pune.

In an attempt to enhance the applicability of poly(ethyleneglycol) phases, they were condensed with chloroacetic acids to get new stationary phases for gas chromatography. The retention data of various organic compounds showed that they were highly selective for chloro and hydroxy compounds.

The dichloro phase was found highly specific and an ideal substitute for the parent phase owing to an enhanced resolution power and a wide range of operational temperature. The dichloro phase was successfully employed to analyze aqueous solutions from pesticide processes, namely dimethoate and ethion.

Dimethoate, a widely used pesticide, was thermally decomposed to evaluate the effect of temperature on its decomposition. The material was separated into organic and inorganic parts. The former was analyzed by gas chromatography for percentage determination and then subjected to GC/MS analysis to get mass spectra for structure elucidation. Some of the components were identified. On this basis, attempts were made to throw light on the explosion phenomenon by polarization of bonds, cyclic intermediates, and migration of groups. These have also been correlated with environmental degradation.

An efficient two-stage TLC technique has been developed to analyze major metabolic products of imidan. It is useful for all types of decomposition studies.

Hydrolysis with NaOH, HCl and Na_2CO_3 was attempted for a suitable detoxication method and to prove its identity relationship with biological transformations. Modes of stepwise hydrolysis have been determined. The chemistry of P-S-C-N system and the usefulness of TLC method have been understood.

An important contribution of the study is that the analytical method developed and the hydrolysis studies can be applied for effluent treatment.

Shri Kadam, who carried out the studies under the guidance of Dr B.B.Ghatge of NCL, was awarded Ph.D. degree by Poona Uni-

versity for his thesis based on the study. □

ITRC's Foundation Day

The Industrial Toxicology Research Centre (ITRC), Lucknow, celebrated its seventeenth Foundation Day on 4 November 1982 with Dr Shantilal J.Mehta, an eminent surgeon and founder-Director of Jaslok Hospital, Bombay, delivering the Foundation Day address.

Expressing concern over the increasing number of scientists and technologists going away to foreign countries because of lack of jobs and research facilities in India, Dr Mehta called upon industrialists to help create more and more research institutions. Such research institutions may serve a two-fold purpose — these would check, to some extent, scientists from seeking openings abroad, and furthermore the research done by these institutions could greatly benefit industrialists, he said. Referring to the poor conditions prevailing in the hospitals all over the country, Dr Mehta emphasized the need for management experts to take care of hospital administration. There should be good rapport between the medical men and management experts to improve the functioning of hospitals, he said.

Dr Mehta spoke appreciatively of the research work being done by ITRC scientists, particularly their efforts to reduce the risks and hazards of industrial workers and for collecting base-level data on health hazards in factories and on farms producing or using toxic chemicals.

Dr C.R.Krishna Murti, ITRC's Director, in his welcome address, outlined the laboratory's achievements during 1981-82. This laboratory continued collaborative studies with the Neurology Department of K.G.'s Medical College, Lucknow, on the health effects of

pesticides. Macular degeneration, possibly caused by insecticides, was being observed for the first time. ITRC had drawn up a programme for in-depth studies on the etiology and management of this occupational malady. He referred to the services of the Occupational Health Centre at Kanpur, a whole-time extension activity of ITRC, which had conducted follow-up studies on 600 cases earlier referred to it, and examined over 500 new cases. A prospective cross-sectional survey of cancer morbidity in Kanpur owing to chemical exposure would be undertaken in collaboration with the J.K.Cancer Institute and G.S.V.M.Medical College, Kanpur, he said.

In collaboration with the Department of Social Work of Lucknow University, ITRC had initiated a survey of the health and socio-economic conditions of about 300 families of artisans in Firozabad and Shikohabad, Uttar Pradesh, engaged in the hazardous bangle-making trade.

Dr Murti also referred to the work done by ITRC which had led to the preparation of documents for the health safety standards of household detergents. The Indian Standards Institution (ISI) and the Directorate General of Technical Development had sought the services of ITRC in evolving procedures for implementing the requirements of safety standards, he said.

An FAO-sponsored project on 'Food contamination monitoring—India and Nepal' was completed and the report on residues of pesticides, heavy metals and mycotoxins in market samples of food articles was submitted. An overview on pesticide residues in food articles and food materials had been prepared on behalf of the Pesticide Environment Pollution Committee set up by the Central Insecticide Board of the Government of India

and the Environment Research Council of the Department of Environment, he said.

With regard to metal toxicity, a low-molecular-weight glycoprotein present in animal tissues was found to possess a specific binding affinity to manganese which may be involved in its transport and toxicity. Evidence had also been adduced to indicate that growing animals were likely to be more sensitive to cadmium toxicity.

Studies on the binding of benzanthrone to skin had revealed that collagen was one of the main macromolecules involved in the uptake of the dye. Survey of industrial dyes for contamination by cancer-causing chemicals had been continued.

With regard to the cancer induced by industrial chemicals, one of the mineral oil fractions used extensively in the processing of jute had been shown to be both carcinogenic and cocarcinogenic by the mouse skin bioassay developed by ITRC scientists.

A model microcosm was set up to simulate a terrestrial aquatic system to explore the long-term ecotoxic effects of household detergents. The ITRC Director also referred to the services which his laboratory had rendered to industries. Safety standards from the point of human health had been drafted for detergents on behalf of ISI. Pesticides/pesticide formulations/plastic materials for storage and other referred compounds had been evaluated for their safety. A number of toxicity data sheets on chemicals had also been prepared for and on behalf of industries. □

CONFERENCE BRIEFS

IUPAC Symposium on Polymeric Materials

Dr R.A.Mashelkar of National Chemical Laboratory (NCL), Pune, gave an invited lecture in the plenary

session of the international symposium on 'Interrelations between Processing, Structure and Properties of Polymeric Materials' organized by International Union of Pure and Applied Chemistry in National Technical University of Athens, Greece, during 29 August -2 September 1982. Dr Mashelkar was one of the eight invited speakers who made presentations in the plenary session.

The NCL scientist presented a lecture entitled 'A unified free volume approach to transport phenomena in polymeric media' in which he described the work he has been carrying out jointly with his colleague Dr M.G.Kulkarni. The work pertains to the development of a new altered free volume state model (AFVS) which analyzes and correlates a variety of transport phenomena in polymeric media within a single unified framework. The key concept in the study has been the calculation of AFVS of the polymeric medium with respect to a carefully defined reference state. By this approach it is possible to predict the influence of alteration of many variables including changes in the physico-chemical and structural attributes of the polymeric systems on viscous, diffusive, thermal and electrical transport processes.

* * *

Unesco Asian Regional Seminar on Information User Orientation

Smt.C.M.Anand of Indian National Scientific Documentation Centre (Insdoc), New Delhi, participated in the title seminar held in Manila, Philippines, 2 - 12 November 1982. The seminar was organized by Institute of Library Science of University of Philippines in collaboration with the Unesco National Commission of Philippines and Unesco's Division of General Information. Her report:

Twenty-seven participants, including three from India, representing ten countries of South-East Asia, besides some 50 observers comprising researchers and specialists in information, discussed their experiences in readers' services and user-oriented activities, especially the newer methods and latest trends. Prof A.J.Evans, of Loughborough University of Technology, UK, was the course director.

Lectures and expositions by a number of foreign and local resource personnel preceded the discussion sessions. The seminar's focus was largely on current developments in user education, particularly the use of audio/visual aids, computerized information systems, on-line searching and similar techniques in promoting the use of information systems and services. An interesting feature of the seminar was the presentation of hands-on experience in using an interactive search system. This was provided to the participants through the computer terminal at Manila, which had access to 'TIS' Intelligent Gateway computer at Lawrence Livermore National Laboratory, California, Lockheed's DIALOG, and SDC's ORBIT search services.

Smt. Anand demonstrated an instructional tape/slide kit which Insdoc has developed for school-going children under its user education programme. The kit is of 35 min. duration and contains 165 colour slides. It has been developed to enthuse children in the use of school libraries and to make them aware of the contents of various types of reference books.

The Insdoc delegate further reports that the seminar made a set of seven recommendations, among them: (1) Unesco, through its concerned committees, should strongly advise library and information schools to include a course

or module on user orientation and education in its programme; (2) International bodies, such as Unesco, should assist developing countries by selecting, say, one institution in each country and providing it with necessary equipment and facilities for computer-assisted information retrieval from worldwide sources for stimulating public awareness of the wealth of knowledge available to them; and (3) Unesco should be more positive in following up and monitoring activities that have been initially stimulated either by such seminars as this or as a result of proposals emanating from the visits of specialists.

It may be mentioned that the Review Committee on Postgraduate Education and Research in Engineering and Technology (in India) has, in its report (1980), expressed the need to educate and train information users by introducing user education/training programmes in postgraduate institutions and research centres, observes the CSIR participant at the Unesco seminar.

* * *

Workshop on Dried Fish Production and Storage

Shri N.V.Sripathy, project coordinator, CFTRI Fish Technology Experiment Station, Mangalore, attended the workshop on 'Dried Fish Production and Storage' held at Serdang, Malaysia, 2-5 November 1982. The workshop was organized by the Indo-Pacific Fisheries Council of FAO. Shri Sripathy's participation was sponsored by FAO for whom he had earlier, in March-April 1982, completed an assignment. The CFTRI scientist had visited selected fish technology institutes in Bangladesh, Indonesia, Malaysia, Philippines, Singapore, Sri Lanka, and Thailand with a view to evaluating the on-going research programmes on traditional fish

products including dried fish. He presented his report to FAO on the assigned project at the workshop. Shri Sripathy's report on the workshop:

The workshop covered: (i) Production of dried fish, (ii) dehydration methods, (iii) quality standards and acceptability, and (iv) marketing, the concluding panel discussion being devoted to the future of dried fish.

The participants in the workshop included representatives from Australia, Bangladesh, India (only Shri Sripathy), Indonesia, Malaysia, New Zealand, Norway, Philippines, Sri Lanka, Thailand, and UK, besides FAO representatives.

Many of the papers related to the state-of-the-art in the dry fish industry in the individual countries of this region. As fish drying is artisanal and traditional in all the countries and does not come within the purview of the organized sector of the industry, a systematic study of the structure and ramifications of the industry would seem to be necessary in attempting to bring about scientific or technological improvements. This type of study was presented in a paper from Malaysia.

Studies relating to the development of direct, indirect and combination insolation dryers as well as agro-waste fuelled dryers for fish drying are being conducted in Malaysia, Philippines, Bangladesh, and a few other countries. Although an ideal design is yet to be perfected, the need was felt to continue this line of investigation so as to arrive at commercially adoptable techniques.

The need for presenting consumers with dry fish products of far better quality than at present available in the markets is clear, but the working strategy for doing so is not so. The merits and demerits of packaging, the problems

of insect infestation, and the relationship between water activity and shelf-life were some of the more important subjects of papers presented.

As to the future of dried fish, it was apparent that both the increase in population and limitation of energy make it inevitable for dry fish production, with its low-energy requirement, to continue to be extremely viable. This is all the more reason why it becomes necessary to bring about an all-round improvement in the quality of the traditional product.

The workshop brought together scientific workers from different countries where the problems relating to dry fish are so similar. Exchange of research approaches and results could not have been more appropriate, observes the CSIR scientist. □

PERSONNEL NEWS

Appointments Promotions

Shri R. Viswanathan

Shri R. Viswanathan of Central Electrochemical Research Institute (CECRI), Karaikudi, has been promoted, on assessment, as Scientist EI (1 March 1980).

Shri Viswanathan (born 27 June 1933) obtained his B.Sc. degree (1952) from University of Madras and joined CECRI in 1953. Deputed to Australia in 1971 under the Colombo Plan, he received training in extractive metallurgy. He has been associated in the development of electrolytic production of cuprous oxide from copper scraps and electrolytic deposition of metal powders like copper and zinc. As publication manager he now looks after the publication of *Corrosion Bulletin* from CECRI's Madras unit. A founder-member of Society for the Advancement of Electrochemical Science and Technology (SAEST), he has to his credit 21 papers and four patents.

Dr N.V. Parthasaradhy

Dr N.V. Parthasaradhy of Central Electrochemical Research Institute (CECRI), Karaikudi, has been promoted, on assessment, as Scientist EI (1 June 1981).

Dr Parthasaradhy (born 5 Aug. 1935) did his M.Sc. (1957) from Banaras Hindu University and obtained his Ph.D. in 1972. With CECRI since 1957, he has specialized in electroplating. His work on modified self-regulating high-speed formulations and tetrachromate chrome bath of the self-regulating type are of considerable industrial importance. He has also been associated with the establishment of a new extension centre of CECRI at Cochin. On behalf of CECRI he has made an industrial survey of electroplating industries in the country. A consultant to several bodies, and a founder-member of SAEST, he has to his credit 37 research and eight review papers.

* * *

Dr K.C. Narasimham

Dr K.C. Narasimham of Central Electrochemical Research Institute (CECRI), Karaikudi, has been promoted, on assessment, as Scientist EI (1 June 1980).

Dr Narasimham (born 17 May 1935) obtained his M.Sc. (1963) and Ph.D. (1974) from Sri Venkateswara University, Tirupati. With CECRI since 1954, he has contributed to the development of insoluble anodes, like lead dioxide anode which finds use in the production of several inorganic products. As project manager, he was associated in the setting up of a pilot plant for the production of potassium and ammonium perchlorates. A few of his processes have won him innovatory awards from National Research Development Corporation of India. Deputed to France in 1967 under the Indo-French Technical Collabora-

tion programme he worked in CNRS laboratory, Paris, on double layer measurements. He is a life-fellow of SAEST, a fellow of Indian Chemical Society, an associate member of Institution of Chemists, and a member of National Institute of Quality Assurance. He worked as technical director of Chlorate India Private Ltd, Tirupati, under the CSIR's Scientist-Entrepreneur Scheme during 1979-1981. He has to his credit 77 papers and 20 patents.

* * *

Shri P.L.Annamalai

Shri P.L.Annamalai of Central Electrochemical Research Institute (CECRI), Karaikudi, has been promoted, on assessment, as Scientist EI (1 Sep.1982).

Shri Annamalai (born 13 Nov. 1930) obtained B.Sc.(1951) and B.Sc.(Tech.) (1953) in chemical engineering, both from University of Madras. He has been with CECRI since 1954. Deputed to France on a French government scholarship during 1964, he received training in industrial chemistry and corrosion in University of Paris. At present he heads the Planning and Budgeting Section of the institute. An associate member of Indian Institute of Chemical Engineers, a member of SAEST and of National Institute of Quality Assurance, he has to his credit 29 research and six review papers and a patent.

* * *

Shri P.V.Vasudeva Rao

Shri P.V.Vasudeva Rao of Central Electrochemical Research Institute (CECRI), Karaikudi, has been promoted, on assessment, as Scientist EI (1 Sep.1981).

Shri Rao (born 2 Oct.1931) obtained his B.Sc.(1951) from University of Madras. With CECRI since 1953, he has worked on batteries, powder metallurgy, and hydrometallurgy. His contributions

in battery technology include improvement of the energy density of lead-acid battery for vehicular application, and development of a variety of nickel-cadmium batteries. In metallurgy he has been associated in the development of two new techniques, viz. direct electrochemical reduction and slurry electrolysis for the production of metal powders, and economic recovery of metals like iron, zinc, copper, silver, lead, and cadmium. Eleven of the processes developed by him have been released to industry.

He is recipient of the National Research Development Corporation of India's Award (1971) for the process on production of zinc powder from industrial byproduct zinc compounds by direct electrochemical reduction method; of National Metallurgists' Day Award (1972); and of Binani Award (1974). A fellow of Institution of Chemists (India) and of SAEST, he has to his credit 66 research and 18 review papers and 17 patents.

* * *

Shri A.K. Garg

Shri A.K. Garg of the Bridges Division of Central Road Research Institute (CRRI), New Delhi, has been promoted, on assessment, as Scientist EI (1 Nov. 1981).

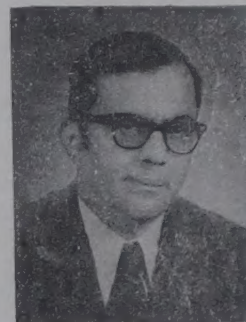
Shri Garg (born 4 Nov. 1938), after graduation in civil engineering with honours and a brief stint as a construction engineer joined CRRI. Here he has been engaged in several projects pertaining to bridge decks. Visiting FRG in 1969 and UK in 1975, he acquainted himself with the then latest techniques in bridge construction and testing procedures. His work on thin-bonded overlays and shear stresses in rigid pavements has found place in standards, and that on the design of retaining walls with relief shelf and well foundation on hard rocks is receiving acceptance in reducing construction costs. Currently he is engaged in the development of expansion joints for

highway bridges suitable under Indian conditions. He has some 25 research papers and 20 technical reports to his credit and is associated with several committees of the Indian Roads Congress and Indian Standards Institution.

Honours & Awards

Shri D.D. Akerkar wins
Indranil Award for Metallurgy

Shri Akerkar, head of the Extractive Metallurgy Division of National Metallurgical Laboratory (NML), Jamshedpur, has been chosen for the Indranil Award for Metallurgy for 1980-81 of the Mining, Geological & Metallurgical Institute of India. His varied contributions in the field of extraction metallurgy in general and ferro-alloys and electric smelting in particular have fetched him the award.



Shri Akerkar is instrumental in the development of technology for extraction of vanadium pentoxide from both the vanadium-bearing sludges of alumina plants and from vanadium-bearing titaniferous ores. Two commercial plants have been designed and commissioned under his guidance for the production of vanadium pentoxide from the vanadium-bearing sludges of alumina plants. He has also developed processes for the extraction of vanadium-enriched slag and low-silicon, low-phosphorus pig iron at Visvesvaraya Iron & Steel Ltd, Bhadravati, from the vanadium-bearing titaniferous ores of Masanikere in Karnataka. Recently commercial production trials were conducted in a 13,200 kVA submerged arc furnace at Bhadravati. A process (patented) to recover vanadium pentoxide from

vanadium-rich slag is being tested on a pilot-plant scale.

A number of pilot-plant investigations in smelting of iron ores in a submerged arc furnace to make basic-grade pig iron have been conducted with the raw materials supplied by a number of companies.

The production of calcium silicide, which is imported in India today, has also been developed under his guidance, and currently certain raw materials are being tested with a view to conducting pilot-plant trials for setting up a commercial plant in the country.

Shri Akerkar's current investigations relate to extraction of nickel and cobalt from lateritic ores, base metals from complex sulphides, development of solvent extraction reagents, refining of ferro-silicon, extraction of nickel, cobalt and copper from polymetallic sea nodules, and pollution-free process for recovering lead from battery scrap.

He has over 30 publications and 24 investigation and research reports to his credit in addition to some important feasibility and design reports and 5 patents.

Shri Akerkar holds a B.Chem. Engg. and M.Sc. (Tech.) degree of Bombay University and M.S. in chemical and metallurgical engineering of Cornell University, USA. Joining NML in 1963 as a Pool Officer, he now holds the position Scientist EII. □

OBITUARY

Shri G.N.Jaswal

Shri G.N.Jaswal, Senior Sales & Distribution Officer, Publication & Information Directorate, New Delhi, passed away on 2 December 1982 prematurely after brief hospitalization in the city. He was 52.

Shri Jaswal was associated with *Science Reporter* for 15 years, he having joined CSIR in 1967. The phenomenal rise in the circulation of the CSIR's popular science monthly is in itself a silent tribute to his dedicated work for more than a decade and half. □

ANNOUNCEMENTS

International Seminar on Role of Fundamental Research in Developing Countries

The National Institute of Science, Technology and Development Studies (NISTADS), New Delhi, is organizing the title seminar at New Delhi from 7 to 10 February 1983 to discuss the issues which impinge upon the promotion of fundamental research and development of science and technology in developing countries.

The main objective of the seminar is to explore the desirability or otherwise of the developing countries' undertaking fundamental research. To be discussed at the seminar are such issues as: (i) policies the developing countries should adopt in this regard; (ii) direct or indirect benefits which are likely to accrue consequently; (iii) institutional arrangements and infrastructure required to be developed; and (iv) nature and mechanism of cooperation between developed and developing countries, on the one hand, and among developing countries themselves on the other.

The deadline for receiving full papers from contributors is 15 January 1983. Further details obtainable from Prof.A.Rahman, Director, or seminar convener Dr V.N.Vashist, National Institute of Science, Technology and Development Studies, CSIR Complex, Hillside Road, New Delhi 110012.

* * * *Symposium on*

Microprocessor-based systems

A symposium on 'Microprocessor-based Systems' covering total aspects and related problems in major application areas will be held at Central Electronics Engineering Research Institute (CEERI), Pilani, on 5-6 May 1983. Technical sessions will be devoted to: (i) design of microprocessor-based systems

(covering hardware and software); (ii) microprocessors in process control industry (sugar, mining, textiles, paper, steel, etc.); (iii) microprocessors in power electronics systems and transportation and (iv) microprocessors in large annunciator panels and color graphic display systems.

The deadline for receipt of abstracts is 15 January 1983.

The registration fee for participation in the symposium is Rs 200, which includes lodge board, local transport, lecture notes etc. Fee payable by demand draft in favour of CEERI drawn on State Bank of Bikaner and Jaipur, Pilani or United Commercial Bank, Pilani. Contact person: Shri R.R.Samnoir, Convener, Microprocessor Symposium Steering Committee, CEERI, Pilani 333031.

Seminar on Cooperation in Information Management

The above seminar, which was scheduled to have been held on 17-18 January 1983, has been postponed to 14-15 February 1983. The venue remains the same National Metallurgical Laboratory Jamshedpur. [See CN, 31(1982) 160 & 168].

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The Council proposes to appoint three senior research scientists in the position of Scientist F at National Aeronautics Laboratory, Bangalore. The posts are one each, in the divisions/disciplines of (i) materials science, (ii) aerodynamics and (iii) systems engineering. Scale of pay: either Rs 2250-125/2-2500-F or Rs 125/2-2750 or Rs 2000-125/2-2500. Further details about the posts and prescribed pro forma for sending curriculum vitae obtainable from Joint Secretaries (Administration), CSIR, Rafi Marg, New Delhi 110001. Deadline for receipt of applications at the above address 3 February 1983.

